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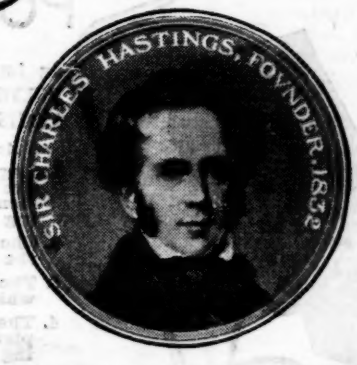

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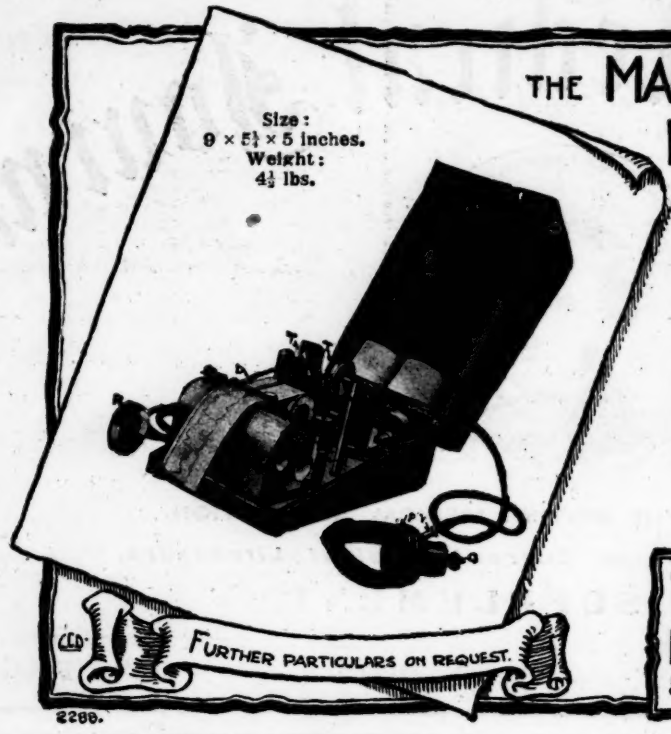

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Norman Kerr Memorial Lecture

ON

DRUG ADDICTION.

DELIVERED BEFORE THE SOCIETY FOR THE STUDY OF INEBRIETY, OCTOBER 9TH, 1923,

BY

SIR W. H. WILLCOX, K.C.I.E., C.B., C.M.G., M.D., F.R.C.P.,

PHYSICIAN TO ST. MARY'S HOSPITAL; MEDICAL ADVISER TO THE HOME OFFICE.

DR. NORMAN KERR, in memory of whom we are assembled here to-day, devoted his life's work to the study of inebriety, and it may be truly said of him as of other good and great men, "Their work lives after them."

This society, of which he in 1884 was the illustrious founder, has steadily and perseveringly and with increasing influence and power followed the principles for which it was founded—"To investigate the various causes of inebriety and to educate the professional and public mind." The Society for the Study of Inebriety is of itself a fitting monument to the memory of Norman Kerr. His devotion to the subject he constantly had at heart, and his persevering efforts had a great share in the passing of the Acts for the reform of inebriates from 1879 to 1888. His leisure time was spent in compiling carefully written works on the subject dear to him, and these remain with us as examples of the humanity and scientific spirit with which the study of inebriety of all kinds should be approached at the present day.

In all his writings Norman Kerr insisted on regarding inebriety as a disease rather than a wilful vice. He pointed out that alcoholism and drunkenness were only one variety of the disease "inebriety," and to avoid confusion suggested as an alternative term for inebriety "narcomania," which is literally a torpor mania (νάρκη, torpor), or in other words an overpowering impulse for narcotism by any intoxicating or anaesthetic substance. The disease of inebriety or narcomania he regarded as a true intoxication mania, the diseased inebriate often utterly abhorring the liquor (or drug) which he would barter his salvation to procure.

DRUG ADDICTION.

It is impossible to name with limitation the drugs which may give rise to an addiction habit, because any drug having an intoxicating action on the cerebrum may give rise to addiction, and new drugs of organic composition are being daily added to our pharmacological armamentarium, the effect of which as regards addiction is at present unknown. In this respect a word of caution is necessary. New organic compounds are being constantly discovered for which it is claimed that they do not cause addiction and that they are in every way capable of replacing those drugs, such as cocaine, morphine, and heroin, which are dreaded for their tendency to lead to the drug habit. The claim that a new drug is not likely to lead to "addiction habit" requires the most careful and extended trial both experimentally and therapeutically before it can be admitted.

To quote one well known example—novocain. This has been successfully used in certain operations as a substitute for cocaine, but it does not have the anaesthetic effect on mucous membranes characteristic of cocaine, and is used solely for infiltration of the subcutaneous tissues; for this purpose it is an admirable anaesthetic. Novocain is not known to give rise to "addiction," but has been almost exclusively used by surgeons. Prescriptions for it have not found their way into the hands of the public, so that there has not been the opportunity of testing the addiction properties as has been the case with cocaine. It is possible that the hypodermic administration of novocain might, if long continued, give rise to addiction. One must keep an open mind with regard to addiction properties of new drugs. I shall therefore restrict my remarks to drugs which are well known to have given rise to addiction. These are:

Opium and its alkaloids, morphine and heroin. ? Dionin not codein, cocaine.
Diethyl barbituric acid and other alkyl, aryl, or metallic derivatives of barbituric acid, such as veronal, medinal, proponal, dial, luminal, etc.
Chloral.
Cannabis indica.
Sulphonal and its homologues, trional and tetronal.
Chloroform and ether.
Paraldehyde.
Hyoscine (very sure).

The most important of the drugs of addiction are: opium, morphine, and heroin; cocaine; the veronal group; chloral; cannabis indica.

Let us consider first drug addiction in relation to those drugs included under the Dangerous Drugs Regulations—namely, opium, morphine, heroin, cocaine, and their derivatives—since in the vast majority of cases it is these drugs which are responsible for addiction and which are a menace to the national health and well-being.

ETIOLOGICAL FACTORS: STATISTICS.

Is drug addiction common in this country? It is impossible to answer this question with mathematical accuracy, for no statistics are available. Speaking from personal experience, and a close study of toxicological medicine extending over the last twenty years, I am of opinion that drug addiction is rare in this country amongst the working and professional classes. Persons of this class, we may call them "the citizen class," become victims of the drug habit often from taking the drug in medical prescriptions and through no fault of their own. They are honest in their intentions and in their lives, and find themselves the victims of a terrible habit—or, as we would better term it, they became afflicted with "addiction disease." They conceal their plight for a time, but ultimately realize that disaster is imminent, and then they seek medical advice. They wander in their distress from one doctor to another, vainly seeking a cure, and their trouble becomes known to many. There is thus a tendency to exaggerate the number of drug victims of this type. I believe the number in this country to be very small.

There is another class of persons in whom the drug habit is very common. It includes those who devote their lives to so-called pleasure seeking and the search for new excitements and sensations. In American literature they are described as the "Underworld." They might be termed the "Vicious Group," the addiction arising either purely as a means of endeavouring to induce pleasurable sensations or as the result of evil association with addicts, leading to the corruption of good habits. Amongst the "vicious group" cocaine, morphine, and heroin are the drugs usually employed, either hypodermically or as snuff. The "vicious group" of drug addicts is to be found in London and our great cities. Fortunately it is a small group, and one whose influence is not extensive. Addiction of the "vicious" type is a canker to be stamped out, though one must admit that this form of drug addiction is not such a serious menace to the national well-being as that affecting the citizen class.

IMMEDIATE CAUSATION OF DRUG ADDICTION.

The commonest cause of drug addiction in this country, if we exclude the "vicious group," is undoubtedly the prescription of the drug for medical purposes.

The Relief of Pain.

It is common for morphine and heroin to be prescribed hypodermically for this purpose. The use of these drugs is necessary in certain cases. It may be necessary, in order to alleviate pain and promote sleep, for a hypodermic injection of morphine or heroin to be prescribed on one or two nights after an operation, particularly in abdominal cases. Too much care cannot be exercised by surgeons in this respect, and instances have occurred where harm has been done or a drug addiction developed.

Recently there has been under my care a most serious case of heroin habit in a patient who has done everything possible to overcome the addiction. This patient, seven years ago, was given

after an operation for appendicitis a dose of 1/12 grain of heroin every night for five weeks. This led to the addiction habit. At first the heroin had a stimulating effect, and as this wore off the dose was increased. The result has been that the patient has become a physical and nervous wreck and in spite of several courses of treatment it has been impossible for the patient to overcome the addiction habit.

Another case may be cited where, after an abdominal operation for gall stones, a patient was given on four successive nights 1/4 grain of morphine. Suppression of urine ensued, the condition not being recognized until too late. I have no doubt that in this case the toxic action of the morphine led to the paralysis of the renal function.

It is to be feared that after operations morphine and heroin are too often given hypodermically as a routine practice without sufficient regard to the dangers of toxic action of the drug, and to the equally disastrous risk of the development of addiction disease. It should be realized that, quite apart from the dangers of the development of drug addiction, morphine and heroin have a depressing and harmful effect on all the excretory and secretory organs, and so should be avoided as far as possible in all cases.

For Relief of Pain of Neuralgic Type.

The hypodermic use of morphine, heroin, or cocaine is to be avoided as far as possible. Other methods of treatment are usually available, such as local treatment by radiant heat, diathermy, or other electrical treatment, or by external anodyne applications. Many analgesic drugs, such as phenacetin, pyramidon, aspirin, are of use, and where a particular nerve trouble is involved alcohol injections are invaluable. The hypodermic injection of addiction drugs should be avoided, if this is possible, and should be a last resort. How easy it is to relieve the pain of these conditions by the injection of a small dose of heroin or morphine, and how quickly does the repetition of the dose become necessary!

The transition from pain due to organic causes to painful feelings of psychoneurotic type cannot be detected, and in cases of this type the use of addiction drugs is likely to lead to the paroxysmal recurrence of painful impressions and the demand for repeated doses. Neuritis of local origin, such as sciatica, brachial neuritis, etc., should never be treated by injections of addiction drugs, since their use retards the cure of the local condition and inevitably leads to the danger of addiction.

It must be admitted that cases do occur where morphine and heroin are necessary. For example, the involvement of nerve by malignant disease, or in that painful condition "causalgia" arising from the involvement of nerves in scar tissue. In the former case it may be necessary to continue the administration. In the latter surgical treatment is advisable to remove the cause of the nerve irritation.

The Hypnotic Habit.

In acute conditions it may be necessary to procure sleep at all costs, and for this purpose there is no surer method than the administration of morphine and heroin hypodermically. Repetition is to be avoided. Too often, however, the terrors of insomnia are impressed upon the patient. The selection of the hypnotic at night is as carefully considered as is the menu of the veriest epicure, and the patient regards the hypnotic drug as one of the essentials of life. This is a deplorable condition, and is bound to lead to the disaster of drug addiction of some kind, whether by morphine, heroin, or some one of the veronal group.

The continued use of drugs for insomnia is a method of treatment which is harmful for the cure of the condition, and patients should be led to take this view. The terrors of insomnia are not to be compared with those of drug addiction, and a little sleep following natural methods of treatment is of far greater benefit than the more prolonged abnormal condition of sleep produced by narcotic drugs.

Psychological Aspects.

The psychoneurotic factor looms large in drug addiction. Given an exciting cause—for example, the repeated daily administration of a narcotic drug—the danger of addiction is very much greater in patients with a neuropathic temperament. A family history of insanity, neurosis, or of addiction to alcohol or drugs often exists amongst drug addicts, and they themselves, previous to their addiction, often present definite signs of nervous instability. The removal of any sources of irritation to the nervous system is of importance, since a neurotic condition may be induced by irritating stimuli. Thus, as has been pointed out by Ernest Clarke, eye-strain may lead to a neurosis and so pave the way for drug addiction. Mental worry and anxiety may similarly lead to a predisposing anxiety neurosis.

Often a psychological complex of a depressing type is present in patients of this group, and there is a subconscious cry for relief from mental suffering. Persons of this type are out of harmony with their environment. They constantly call for something to "drown the cares of life." This relief is temporarily obtained by the administration of a narcotic drug, and as surely as this occurs so inevitably does a still deeper stage of mental agony develop, which is only to be relieved by the further resort to the narcotic. "Facilis descensus Averni." A vicious circle is established. The effects of drug addiction call out all the weak points in the patient's neuropathic inheritance. Too much care cannot be taken in the avoidance of the use of narcotic drugs in patients of this type. In them the knowledge that temporary relief from mental depression may be obtained from resort to drugs of addiction is often gained by association with addicts. Hence the importance of making access to these drugs impossible except by medical prescriptions. This is one of the main objects of the recent Dangerous Drugs Acts.

Toxaemia from Focal Sepsis.

In many cases patients, before resorting to a drug habit, are suffering from the toxaemia due to some latent focus of infection, perhaps the toxic absorption from septic teeth, or from some focus in the nasopharynx, such as septic tonsils or an infected antrum. The toxic absorption causes a sense of intense mental depression, irritability, and hypersensitiveness. In other words, a neuropathic condition is established which prepares the soil for drug addiction. In cases of this type narcotic drugs are often taken for the temporary relief of mental suffering, and a vicious circle is established.

The recent work in America showing the very important part played by focal sepsis in the causation of mental disease is an illustration of a physical toxic basis for many cases of mental disorder. Exactly the same relation occurs in many cases of drug addiction, and the neuropathic condition produced by toxic absorption is really at the bottom of the trouble. Focal sepsis should always be carefully looked for in cases of drug addiction, and one of the first elements of treatment should be the removal of septic absorption from such causes.

In the early part of this year there was under my care a case of alcohol addiction of several years' duration in a busy city man. This patient told me that he really took the alcohol as a stimulant to counteract the intense depression which overtook him in his daily work, and not for any real liking. Investigation of the mouth by x rays showed several apical dental septic foci. The removal of the septic teeth followed by rest and change resulted in a restoration to good physical health. There has been no return to alcoholic consumption of any kind, nor any desire for this form of addiction, and he has resumed his strenuous busy life without any resort to artificial stimulation.

In a case of combined morphine and alcohol addiction recently under my care there was an alternation of periods of alcohol addiction of the dipsomania type with periods of morphine addiction. The patient was an active man of middle life and obviously suffering from the effects of some toxic process in addition to his drug and alcohol addiction. An x-ray examination of the mouth disclosed a deep-seated infection which had obviously existed for years. In this case the patient stated that he had no real desire for alcohol or morphine, but took them to counteract the overpowering sense of depression and physical weakness which overtook him. The alcohol and morphine were at once completely withdrawn and nursing home treatment adopted. The oral sepsis was removed by appropriate dental treatment, and this, coupled with rest and change, resulted in a return to good physical health and cure of the morphine and alcohol addiction.

In both the above cases it was quite clear that there was a primary toxic basis for the addiction habit. Other cases might be quoted in illustration of the close relationship of the toxaemia of focal infections to drug addiction and of the importance in such cases of the removal of septic foci.

Focal sepsis and drug addiction are closely related, and though the former may by its physical effects lead to drug addiction, yet in a similar manner the drug habit, by its lowering effect on the immunity mechanisms in the body, may predispose to the development of focal infections, especially those of dental origin.

One Drug Habit Leads to Another.

This is an axiom which may be laid down for almost all cases. The taking of a particular narcotic drug leads to an unstable condition of the nervous system which is indicated by effects on the higher mental faculties. In other words, the soil is prepared for narcotic stimulation of any kind. Thus the morphine addict frequently resorts to cocaine or alcohol as alternative measures of relief for his states of mental depression; indeed, in some cases the craving for drugs of any kind available becomes almost an obsession.

In cases of drug addiction of long standing it is frequently found that a combination of drugs is used, morphine or heroin with cocaine or alcohol being the commonest combination.

Drug Addiction of Long Duration.

There can be little doubt that when a narcotic drug has been taken for a period of years organic changes result in the nervous system, and probably other changes of a biochemical nature occur which alter the metabolic processes of the body. In such cases cure is very difficult and sometimes almost impossible. The drug has become a necessary adjunct to the working of a disorganized nervous system; in other words, it has become an abnormal food.

Every physician who has studied drug addiction is acquainted with such cases where attempts at cure have repeatedly failed and where the daily allowance of a minimum amount of the drug is a necessity. In such cases the withdrawal of the drug may lead to the complete physical and mental breakdown of the individual. He cannot, without its artificial aid, perform the duties of life, and the withdrawal may lead to uncontrollable crimes of violence. Numerous examples of this kind have occurred amongst addicts engaged in artistic or literary work often of high grade.

In Eastern countries amongst the lower castes of society the taking of opium by the mouth causes marked addiction disease. In India certain individuals become so accustomed to a daily ration of opium that they cannot carry on their daily work without it. During the war in Mesopotamia several cases of opium addiction amongst Indians of low caste attached to the Labour Corps were brought to my notice. Often a very small amount—one or two grains a day—was sufficient to maintain an equilibrium and enable them to perform their duties. In a few cases complete mental breakdown and crimes of violence of an irresponsible nature occurred when from some reason the addict was unable to obtain his daily dose of opium.

In the Fen counties of England laudanum and opium addiction used to be not uncommon; possibly the habit arose from the taking of the drug to counteract the effects of malaria which was prevalent in former days, and for which it was a common remedy. The laudanum and opium habit became firmly established, and the unfortunate individuals affected became addicts who existed on a low grade of physical and mental health, for the maintenance of which the drug was obtained at all costs. The taking of laudanum and opium by the poorer classes in this country has fortunately become very rare.

Vicious Causes.

Opium and its preparations—morphine, heroin, and cocaine—are sometimes first taken by individuals who have been told that the drugs have a stimulating effect and produce brilliance in thought. In some persons small doses of these drugs at first have the effect of cutting off inhibitory impulses, and so for a transient period of minutes self-consciousness or stage fright may be forgotten, and a false sense of well-being produced.

An analogous use of the drugs is in the doping of horses, a practice which is severely condemned and punished by the authorities responsible for racing in this country. A horse of uncertain temperament if given a dose of cocaine hypodermically may in a few minutes become more tractable, and perhaps run better in a race within half an hour. After this short period the animal becomes useless, and temperamentally worse than before. The repetition of doping completely ruins the animal, and rarely produces the effect desired.

The use of narcotic drugs in man for their stimulating properties is an extremely dangerous practice which frequently fails in its immediate object and inevitably leads to the terrible vice of addiction.

Association with Addicts.

This is one of the commonest causes. The addict desires nothing so much as the leading astray of those innocent of this terrible vice. The pleasures following the dope are painted in most glowing colours and the neophyte is besought to partake of them. The first few doses may actually produce transient pleasurable sensations, but each is followed by a sense of intense depression and misery, which calls loudly for removal by a further dose. In this manner drug addiction of the vicious type spreads rapidly amongst those associating with its votaries.

Morphine, heroin, and cocaine are deliberately taken by persons of vicious associations in the hope that the strings of new sensations may be played upon. In some cases, especially amongst women of the underworld, cocaine and heroin are taken commonly as snuff, with the idea that transitory mental brilliance and attractiveness are produced. Prostitution and sexual vice are closely associated with drug addiction. Thus cocaine may in the early stages of addiction have an erotic effect, and there is evidence that it is an important factor in the causation of unnatural sexual vice.

Morphine and its derivatives appear to have a sedative effect on sexual impulses and to lead to impotence and sterility. These drugs are taken often by those sexually vicious to stifle the calls of conscience. So great are the cravings of drug addiction that cases are known to me where victims of the female sex have not hesitated to sacrifice their honour in order that a supply of the drug may be obtained.

DRUG ADDICTION A DISEASE.

The taking of a narcotic drug of addiction for a few doses may be termed a vice, but if the administration is continued for a month or so a true disease condition becomes established, with a definite pathology and symptoms.

The drug addict, provided that he has a certain allowance of his drug, is an individual on a low plane of physical health. The complexion is sallow, he is emaciated, and there is evidence of a general lack of function of the secretory organs. The mental symptoms are shown by weakness of character and will, and lack of moral sense.

In some cases a drug addict may show even to an experienced observer few, if any, abnormal signs. The opium or morphine addict, if having his necessary allowance of the drug, may conduct himself normally from the moral and social point of view; and where the daily amount is small he may, for extensive periods, carry on his work in life. The cocaine addict undergoes a more rapid deterioration, both mentally and morally, and is apt to perform criminal acts.

The "withdrawal symptoms" of addiction disease are most characteristic. The sudden stoppage of the drug leads quickly to characteristic symptoms which are both physical, and subjective or mental. These have been well described by Dr. Harry Campbell in his recent able paper on morphine addiction read before this Society (April, 1923).

The objective symptoms—feebleness of the heart's action, tremors, vomiting, purging, and sometimes actual collapse—are unmistakable. In addition there are subjective symptoms, such as pains in the limbs and body of a distressing character. The mental symptoms experienced by the patient are those of restlessness and extreme mental suffering.

The withdrawal symptoms are at once relieved by a dose of the drug of addiction. The prevention of withdrawal symptoms in a confirmed morphine addict can be

worked out with almost mathematical accuracy. Thus in a given case a minimum amount of morphine can be determined which will, for a certain number of hours, prevent the development of withdrawal symptoms. Such symptoms are usually less marked with cocaine than with morphine and heroin, but in severe cases of cocaine addiction of long standing it is a mistake to assume that withdrawal symptoms do not occur; they may be quite marked and even serious.

Withdrawal symptoms of addiction disease are now accepted as forming a definite symptom-complex of characteristic type. They are not symptoms which are purposely assumed by the patient with the object of obtaining a further dose of the drug. The objective symptoms described are a sufficient proof of this.

The experimental production of morphine addiction disease in dogs, and the manifestation of a similar symptom-complex of withdrawal symptoms, have furnished additional evidence that drug addiction is a true diseased condition. A most interesting case or symptoms of morphine withdrawal in a newly born infant has been published by Dr. L. A. Van Kleek in America.

The mother had been a morphine addict for years, taking from 4 to 6 grains daily during her pregnancy.

The child at birth appeared normal, but on the second day cardiac failure, sweating, cyanosis, vomiting, and diarrhoea rapidly developed and the condition became alarming. The usual methods of treatment for shock were tried without success. In view of the fact that the mother was a morphine addict a small dose of opium, in the form of 3 minims of compound tincture of camphor, was given and repeated every one and a half hours for three doses. The symptoms of collapse cleared up as if by magic. On the third and fourth days the same symptoms of collapse occurred, and were relieved at once by the same methods of treatment. After the fourth day the mother was able to suckle the child, which then remained in good health.

In this case it was clear that the child suffered from withdrawal symptoms of addiction disease on the second, third, and fourth days of life. It also appeared evident that the addiction disease was transmitted from mother to child. Sufficient morphine to prevent withdrawal symptoms was present in the milk of the mother, who continued to have her usual daily allowance of morphine. The above case is strong evidence that drug addiction is a real pathological condition or disease.

Pathology of Drug Addiction Disease.

That the condition is caused by morphine and its allies is well known, and the symptomatology is well recognized as a definite symptom-complex. The explanation of why withdrawal symptoms occur is yet to be worked out. American observers, foremost amongst whom is Dr. E. S. Bishop, assert that the taking of morphine leads to the formation of an antidotal substance in the body, which neutralizes the large amounts taken by the addict. It is asserted that this antidotal substance is itself very toxic, and that it continues to be produced in the body if the drug is discontinued. At this stage withdrawal symptoms develop and they are only relieved by a further dose of the drug, which acts by neutralizing the toxic antidotal substance.

This theory, fascinating as it seems in the ready explanation of the production of withdrawal symptoms, has not yet received adequate experimental confirmation. Professor W. E. Dixon, in an address on the drug habit (BRITISH MEDICAL JOURNAL, November 19th, 1921), states that neither morphine nor any other drug causes antibody formation. On the other hand, Valenti rendered dogs tolerant to morphine and found that on suddenly stopping the drug typical withdrawal symptoms occurred. He alleged that injection of the serum from dogs showing withdrawal symptoms caused similar symptoms to develop in normal dogs.

Professor Dixon suggests as an explanation of withdrawal symptoms that nerve cells, after prolonged narcosis, become on reawakening hyperexcitable, and that a further dose of drug is necessary to allay this condition. The fact that increasing quantities of morphine and cocaine are required by addicts can be accounted for by the increased power of destroying these drugs which is developed by the tissues of the addict.

Another explanation of addiction disease which, I think, should be the subject of pathological research, is the probability that definite changes of a degenerative type occur in the nerve cells of the brain, and that this pathological change leads to the formation of abnormal channels of transmission of nerve impulses, whereby abnormal physical and mental effects are produced. It is well known that toxic substances, such as chloroform, affect the nerve cells, causing degenerative changes, demonstrable by Nissl's methods of staining, and it seems likely that similar changes may occur in drug addiction. This view of the subject offers an explanation of the incurable nature of drug addiction in patients who have taken large quantities of morphine, heroin, or cocaine for many years.

Scientific research is sorely needed on the pathology of drug addiction, and there are hopeful signs of light being thrown on the subject in the near future, since special investigations are already in progress.

The Ministry of Health has recently appointed a committee to inquire into the substitutes for cocaine and the possibility of drug addiction arising therefrom. It is hoped that valuable information may be forthcoming from this inquiry which will throw some light on the pathology of drug addiction.

Treatment of Drug Addiction.

Each individual case of addiction requires careful consideration as to the line of treatment to be adopted. I do not propose to discuss in detail the method of treatment, since these were fully dealt with by Dr. Harry Campbell in his recent paper. General lines of treatment only will be considered. When the addiction habit is once established it is essential that treatment should be commenced without delay.

Ambulatory treatment almost always fails and should not be attempted. As Dr. Bishop has forcibly pointed out, there is no panacea for the cure of drug addiction, and the much vaunted "cures" and "patent medicines" are usually worthless and do more harm than good. Some of those advertised as cures have been found actually to contain morphine.

The only treatment that gives a hopeful prospect of complete cure is one which recognizes that drug addiction is a disease, and as such requires the same careful attention to detail that any other disease (typhoid fever, pneumonia, etc.) would receive. Thus the general standard of health should be raised to as high a pitch as possible, any associated toxic or other predisposing factors should be dealt with, and the withdrawal effected under the most favourable conditions both physical and psychical. In this way the prospect of cure is as hopeful as is the case in other diseases.

A great drawback in the treatment of drug addiction is the feeling of hopelessness experienced not only by the patients but often, it is to be feared, by their doctors also.

Treatment in an institution or nursing home with complete supervision is essential. After the preliminary period of investigation and removal of associated predisposing factors, during which a minimal allowance of the drug may be necessary, withdrawal should be effected.

Sudden Withdrawal.

Where the general health of the patient is good and where the addiction is of short duration sudden withdrawal is advisable. I think the dangers of sudden withdrawal have been somewhat exaggerated, and in many cases the hesitation to cut off the drug without delay leads the patient to think that his cure is hopeless. It has been my experience that where the general condition of the patient is good and there is every facility for careful nursing, sudden or very rapid withdrawal may be safely effected and is the most satisfactory method.

In confirmation of this view I may quote the results of the experience of medical officers of prisons in this country which have been kindly given me by Sir Malcolm Delevingne. It is a frequent occurrence for drug addicts to be sentenced to terms of imprisonment, and the invariable rule with regard to them has been sudden withdrawal of the drug. In no case have any alarming symptoms occurred and in only a very few isolated patients has any narcotic drug been given at all. In these cases on one or two occasions a very small dose of liquor morphinae has been given by the mouth, but never has any narcotic drug been given hypodermically.

Gradual Withdrawal.

In cases of addiction of long duration, especially if the general physical condition is of low standard, gradual reduction is advisable. In cases of this type hyoscine has been advocated, a mild hyoscine delirium being produced for thirty-six to forty-eight hours by repeated small doses given hypodermically. At the end of this no morphine is given. The advantage of the hyoscine treatment is that in a long-standing case sudden withdrawal is effected. The disadvantage is that there is apt to be a more pronounced development of symptoms during the period of after-treatment. It is doubtful whether any ultimate advantage is gained from hyoscine treatment.

After-treatment.

After withdrawal has been effected the after-treatment is very important, and in this stage, in addition to general hygienic and medicinal methods, psychotherapeutic treatment is most valuable. The cultivation of the will power and of a feeling of hopefulness and certainty of recovery are most important factors for success in this phase of the treatment.

Cases of Long Standing.

In cases of drug addiction where large doses have been taken for many years, and where the nervous and physical condition of the patient is of a low standard, the prospect of cure is poor, and in some cases practically hopeless. The minimal daily allowance of the drug spaced at as long intervals as possible should be accurately determined, and adequate steps taken that the allowance is not exceeded. In this type of case it is probable that permanent organic changes of a degenerative nature have occurred in the nervous system. During the treatment of drug addiction it is important that alcohol should be avoided, as otherwise alcoholism is likely to follow on the cure. Similarly smoking is best cut off, or reduced to the smallest allowance.

MEDICO-LEGAL ASPECTS OF DRUG ADDICTION.

The world-wide appreciation of the dangers and evils of drug addiction was exemplified by the International Opium Convention which met at the Hague in December, 1911, and January, 1912. A general course of action was agreed upon to which the twelve countries co-operating gave sanction, but it was not to become effective until the other countries not participating had agreed. The final attainment of a satisfactory result was delayed by the outbreak of the European war.

The Peace Treaty of Versailles contained amongst its clauses some tending to the ratification of the Opium Convention. Under the terms of the Opium Convention the consenting nations agreed to frame Acts dealing with the dangerous drugs opium, morphine, and heroin.

In this country the Dangerous Drugs Act was passed in 1920, and under Section 7 of this Act power was given to make regulations for controlling the manufacture, sale, possession, and distribution of the drugs in question. In May, 1921, regulations were issued dealing with the carrying out of the provisions of the Dangerous Drugs Acts, and in 1922 and 1923 certain amendments were made to these regulations.

During the war and down to the passing of the Dangerous Drugs Regulations, control of the sale of narcotic drugs was obtained by the Army Council Order under the Defence of the Realm Act in May, 1916. Orders were made dealing with cocaine and opium which were similar in character to those of the Dangerous Drugs Regulations of 1921. The Defence of the Realm Act Order of May, 1916, dealt with the sale of narcotic drugs to any member of H.M. Forces, and permitted the sale of opium, morphine, cocaine, and heroin only on the prescription of a registered medical practitioner, dentist, or veterinary surgeon. The prescription had to be written out in accordance with the prescribed details, and was to be retained by the pharmacist or dispenser.

The scope of this order was wider than that of the Dangerous Drugs Regulations of 1921, for it included in addition barbitone, chloral hydrate, codeine and heroin, Indian hemp, and sulphonal and its homologues. The restriction of the sale of these drugs to prescription by authorized persons is one which might be followed, with advantage to the public, in future amendments of the Dangerous Drugs Act.

The Dangerous Drug Regulations of May, 1921, and the subsequent amendments were very carefully considered by the Home Office authorities, and the representations of the professions of medicine, dentistry, veterinary surgery, and pharmacy were given the fullest consideration.

The Home Office authorities, amongst whom Sir Malcolm Delevingne, K.C.B., should be specially mentioned for his devoted attention to this difficult subject, did their utmost to meet the wishes of those concerned, consistent with the effective drawing up of the regulations required by the terms of the Convention. It cannot be claimed that these Regulations are at present perfect, but they have been drawn up in a spirit of justice and fairness to all concerned. As regards avoidance of harshness of operation on the professions mentioned, and what is of equal importance, on the addicts affected, the Regulations are a model to other countries.

I know also that moderation and restraint have been shown, as far as possible, by the Home Office authorities and the Ministry of Health in the carrying into effect of the principles of the Regulations. In the difficult position created by the Dangerous Drug Regulations it must be borne in mind that the object for which they were framed can only be satisfactorily attained by the loyal co-operation of the professions concerned with the State authorities.

It has been said that a coach and four can be driven through an Act of Parliament, and it would not be difficult for the letter of the law regarding dangerous drugs to be followed and its spirit evaded. For instance, dilution of dangerous drugs beyond the limits laid down in the Regulations would not prevent their possible use for addiction purposes.

Loyal co-operation will be best engendered by moderation and restraint by the authorities, when technical breaches of the Regulations occur, in which there is evidence that reasonable and proper care has been taken to avoid them. For example, a difficulty arises in the case of cleverly forged prescriptions; the onus of the discovery of these appears to rest with the pharmacist, and, in some cases, even with every reasonable precaution the discovery of such forgery would not be practically possible.

One very difficult question is the continued prescription by medical practitioners of drugs for addicts. I have mentioned instances of incurable addiction where such prescription in amounts as small as can be tolerated is imperative for the preservation of a certain degree of health. On the other hand, the treatment of curable cases by ambulatory methods is to be condemned.

There is no legal power of compulsion for institutional treatment in cases of addiction, except in the very rare cases where the drug is taken as drink, and then possibly the provisions of the Inebriates Act of 1898 might be called into action. For practical purposes this Act is quite powerless in dealing with drug addiction.

From the purely medical asepct it would, in my opinion, be desirable that legal powers should be given whereby drug addiction can be treated by compulsory institutional treatment. At a recent discussion at the Medico-Legal Society (March, 1923) on this subject the legal opinion was emphatic against the advisability, at present, of institutional treatment being made compulsory in cases of drug addiction. Moreover, the special institutions and staffs that would be required for the treatment of large numbers of cases of drug addiction do not, at present, exist in this country, and provision for them would be necessary before any legal enforcement for compulsory treatment were enacted.

Dr. H. A. Burridge gave the Medico-Legal Society last March a very carefully thought out paper on "State effort to rescue victims of drug addiction." In this paper the hardships caused to drug addicts and to the medical profession in the United States by the harshness of the existing laws and regulations were forcibly dealt with.

In America the Narcotic Drugs Acts and Regulations appear to have been framed on the assumption that addiction was a vice and not a disease. The restrictions as regards medical practitioners have been such that large numbers have refused to have anything whatever to do with drug addicts. The drug addict is often prevented from getting by legitimate means any supply of drug to tide him over a period preceding the commencement of a course of treatment, with the result that the illegitimate traffic of narcotic drugs has become most extensive.

Conclusions as to Morphine, Heroin, and Cocaine.

To sum up the present position with regard to morphine, heroin, and cocaine addiction in this country—

(1) Further research is needed on the pathology, symptomatology, and treatment of drug addiction.

(2) The regulations in force are necessary for the control of an evil which is a menace to the public health and well-being of the State, and which, if uncontrolled, would certainly seriously increase.

(3) The regulations in force are at present adequate as regards the legal restrictions imposed, and it is advisable that they should be interpreted with moderation and breadth of view as regards the difficult and imperfectly understood problem of drug addiction.

(4) Compulsory restraint for treatment of drug addicts is desirable, on purely medical grounds, but could not be generally enforced at present, owing to the lack of adequate State provision.

(5) The most effective method of carrying out the spirit of the regulations of the Dangerous Drugs Act is by the loyal co-operation of the professions concerned with the State authorities.

Other Drugs of Addiction.

The Veronal Group.—Barbitone or veronal, medinal, proponal, dial, and luminal, are all dangerous from the liability to addiction. Their continued use leads to the development of a definite symptom-complex, such as an abnormal mental condition, in which delusions and visual hallucinations may occur. The speech may become thick and indistinct and visual disturbances may occur. The gait often becomes ataxic. The veronal habit leads to a disorganization of the moral sense. Veronal and its allies are all toxic and not free from danger where idiosyncrasy is present. There is a great danger of the development of addiction. A common sequel of veronal addiction is suicide, and I have seen a number of such cases. Usually a large dose is taken with the intention of suicide. In one case a young woman, who was the victim of the veronal habit, drank a large quantity of lysol with fatal result. None of the drugs in this group should be obtainable except on medical prescription. At present they are included in Part I of the Poisons Schedule and can be obtained by the public on signing the Poisons Register. I regard all the members of this group as most dangerous hypnotics and strongly advise their avoidance.

Cannabis Indica (Indian hemp) is in common use in Egypt and Eastern countries as a drug of addiction. Bhang or hashish is the name given to the preparation, consisting of the leaves, small stalks, and fruits. "Charrish" is the term applied to the preparation of the plant prepared for smoking. The drug produces pleasurable sensations and is a deliriant poison. A case of its sale in this country as "Persian opium" has recently occurred. Owing to its narcotic and addiction effects it would be desirable for the drug to be added to those included in the Dangerous Drugs Act.

Sulphonal and its homologues, trional and tetronal, are common hypnotics. They may give rise to addiction, and then suicide is not unlikely. It would be desirable that they should only be obtainable on medical prescription.

Paraldehyde may give rise to addiction. The symptoms of the condition are similar to those of alcohol and the treatment the same.

Ether may give rise to addiction, but is rarely met with in this respect at the present day.

Chloral also may give rise to addiction, but its use for such purpose is much rarer than formerly.

Chloroform addiction may arise from repeated inhalations. In one case seen by me a few years ago the patient, who was a scientific man of neuropathic type, inhaled the drug, with the object of killing the germs causing a chronic naso-pharyngeal catarrh from which he suffered. The drug caused hepatitis and jaundice which ultimately proved fatal.

Dionin has only feeble powers in the causation of addiction, though a few isolated cases are recorded. It has been used in the treatment of morphine addiction, and is of some value in warding off withdrawal symptoms. It is not included amongst the dangerous drugs.

Codeine is not really dangerous as an addiction drug, and has been wisely excluded from those in the Dangerous Drugs Act.

Conclusion.

With regard to legislation relating to drug addiction, let us have confidence in those experienced administrators who have charge of this aspect of the question. Let us be temperate in our desires for new legislation, remembering that too hasty legislation may do more harm than good. It is only by the steady method of advance, each step having been carefully thought out and considered in all its aspects, that true progress will be made.

COCAINE AND ITS SUBSTITUTES.

BY

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Purely as a local anaesthetic, cocaine is probably unsurpassed. Disadvantages are, however, associated with its use, especially its toxicity, the varying susceptibility of individuals to its toxic action, and its instability.

An endeavour has therefore been made to examine the evidence available from the clinical side on these points; and further, by experiment, to compare cocaine and some of its substitutes, particularly two recent introductions—butyn and atoxodyne.

The toxicity of cocaine appears to be less than is frequently asserted. The evidence as to "idiosyncrasy" is scanty; and, especially in the most interesting cases of reported death from small doses, the accounts are so meagre as to preclude any chance of criticism.

Evidence of Reported Cases.

The evidence of published cases was examined to discover if possible how far the alleged variable toxicity of cocaine is due to "idiosyncrasy" of the patients, and how far to varying methods of administration. Fifty fatal and very many more non-fatal accidents were investigated. The total available references in the medical libraries of Bristol University and the Royal Society of Medicine extend over a period of about forty years. In a number of cases it was found that reports have been copied from one journal to another several times, often with loss of accuracy.

Deaths Wrongly Ascribed to Cocaine.

Examination of the reports showed that of the fatal cases four seem to have been wrongly ascribed to cocaine poisoning.[1 2] For example: (*a*) Dental injection, dose unknown; the patient became ill on the eighth day and died on the eleventh. Autopsy=septicaemia; coroner's verdict, "blood poisoning." No mention or evidence of poisoning by ccoaine. (*b*) Abadie's patient, aged 71, received two-thirds of a grain subcutaneously. She was considered at the time to have died of apoplexy (second attack). Neither time nor mode of onset of symptoms, nor appearance after death, correspond with cocaine poisoning.

Dose of Cocaine Used in Fatal Cases.

The remaining cases include all those in which, though details are lacking, death was ascribed to cocaine poisoning. It is to be remembered that cocaine in the last century was used with a freedom and in a dose now uncommon. For example, one surgeon reports 1,600 operations in which injections up to 4 grains were given as a routine, with no serious accidents[3]; another frequently injected over 1 grain in children, but not under 3 years old[4]; a third had alarming accidents among infants between 3 and 6 *months* old, from spraying or swabbing the fauces with 4 per cent. solution[5]; a fourth

administered 5 grains daily for months in one case[6]; 8 grains and even 15 grains were advised for hydrocele operation, where of course part was recovered[7]; a textbook advises 2 drachms of 5 per cent. solution (5½ grains) for urethral injection.[8] Fatal and even serious accidents from clinical use seem, however, from the available published reports to have been rare.

Oral Ingestion.

In 13 cases death was due to taking a large dose by the mouth.[2 9 10 11 12] The dose was known in 8, average 22 mg. per kilo.* The smallest fatal doses were: (*a*) about 10 grains in 2 drachms, taken by a woman—it might have been more[10]; (*b*) 12 grains in 10 per cent. solution taken by a girl.[11] A man survived 9 grains solid[13]; and others 10 grains, 22 grains, and it is said 46 grains, diluted.[14] One patient took at least 60 grains daily for months, but died when she took 30 grains in one dose.[12]

Subcutaneous Injection.

Six cases died after subcutaneous injection. In 5 a definite overdose was given—namely, 20, 19, 17, 12, and 8 grains respectively.[2] Injection of 4 grains into the breast caused death.[15] Doses of 18, 15, and 14 grains (in 35 per cent. solution) were survived.[17]

Submucous Injection.

Twelve cases of death are reported following injections in adults for tonsil operations.[22] In 4, owing to carelessness, strong solutions were injected instead of weak—for example, 20 per cent. instead of 0.2 per cent.; the victims received, therefore, one hundred times the intended dose. In 4 more the dose was not known. In the remaining cases the doses were (*a*) 3 drops of ½ per cent. solution (=1/50 grain); (*b*) ¼ grain; (*c*) 20 minims of 1 per cent. solution in adrenaline 1 in 1,000 (= 1/5 grain of cocaine); (*d*) 2 drachms of 0.2 per cent. solution in adrenaline 1 in 1,000 (=¼ grain of cocaine). It seems hardly credible that the injected cocaine alone caused death in (*a*). In (*c*) and (*d*) the dose of adrenaline injected was too high for safety. In none of these cases is mention made of painting the fauces before injection; if this were done the cocaine absorbed may have largely exceeded the doses given; details of all are scanty. In each case death occurred almost at once, showing that the drugs reached the general circulation very rapidly. (It is noteworthy that injections for tonsil operations account for a number of fatal accidents with several anaesthetics, even dilute novocain; the painting before injection has perhaps received too little attention in some cases.) One death followed injection of 10 per cent. solution of cocaine into the nasal septum in mistake for 1 per cent.[32]

Dental injections were twice fatal; dose unknown.[1 19] Two grains and even less gave rise to trouble in a number of dental cases. Very many accidents occurred when dealing with acute inflammatory conditions: the vascularity present, and possibly injection under pressure, appear to have been factors. In one series all the serious accidents occurred with 10 per cent. or stronger solutions.[20]

In one case 1½ grains injected for rectal fistula operation caused death in four minutes.[16] Injections for haemorrhoids caused convulsions with 5 grains and 3 grains, and less serious trouble with several doses of this order.[18]

Injection into Cavities.[26]

Death followed injection of 6 grains in 5 per cent. solution into a recent hydrocele. It was considered that "this relatively feeble dose," safe in chronic hydrocele, was in this case rapidly absorbed by the unthickened tunica vaginalis.

Injection into the recently wounded urethra was responsible for three deaths—doses, 3 grains,[22] 2½ grains, and 1 grain.[16] Death in each case occurred in a few minutes. Absorption, however, from the intact urethra is rapid[30 36]—7 grains caused convulsions.[23]

A dose of 22 grains injected into the rectum caused death in a few minutes.[24] (The surgeon committed suicide.)

Surface Absorption.

Application of 4 per cent. solution to abraded skin caused death in a few minutes; dose unknown.[16] Four fatal accidents followed application to the fauces; doses unknown.[2 32] In another case death followed the application of 20 per cent. solution to the larynx.[32]

Numerous accidents, mainly not very serious, are reported in nose and throat work, especially with 10 per cent. or stronger solutions (without adrenaline). Fullerton in 1891 pointed out that absorption from the nasal mucosa was particularly rapid.[25] In this connexion it is worth remembering that the addict of one type, who spares neither pains nor ingenuity, has discovered that application of solid cocaine to the nasal mucosa is the most rapid, efficient, and economical method of introducing a toxic dose into his cerebral circulation.

* 1 mg. per kilo = 1 grain for the average adult man.

SUMMARY.

Summarizing the above brief survey of 50 reported fatal cases of cocaine poisoning:

Death was not due to cocaine in	4
Death followed oral ingestion in	13
Death followed overdose in	12
Dose was unknown in	12
Death followed employment of a dose stated to be under 5 grains in	9
	50

In the last class, in one case 4 grains was injected into the breast. In the remaining 8 death occurred in a few minutes—clear evidence that the drug had very rapidly entered the general circulation. This appears to be the essential factor in all these cases.[34 35] The circumstances of each case so far as they are known have been briefly considered.

CLINICAL DOSES.

Judging from the published reports we may infer:

A. Fatal poisoning from clinical doses of cocaine is rare. "Idiosyncrasy" to cocaine in this sense is not established.

B. The lethal dose of cocaine for man by subcutaneous injection or by the mouth appears to lie between 12 mg. and 25 mg. per kilo, depending on the concentration.[37]

C. The same dose of cocaine in strong solution is much more dangerous than in weak.

D. For ordinary subcutaneous injections in dilute solution (1/4 per cent.), especially with adrenaline, the old "maximum dose" of 3 grains should be safe.

E. In vascular, including acutely inflamed, tissues, and other situations where the drug may rapidly enter the circulation, very great caution is necessary. This may apply particularly to injections for tonsil operations. (The *intravenous* lethal dose of cocaine for man has been estimated at about 1.5 mg. per kilo.[26] Cocaine has, however, been used intravenously.)

Other points which appear especially from the study of non-fatal cases (to which it has not been practicable to advert in this paper) are:

F. Absorption from mucous surfaces is often rapid.

G. Accidents have become much less common since adrenaline has been in use. (Injection, however, of strong adrenaline into vascular tissue is itself a source of danger. Recent authorities advise 1 in 100,000 solution for injection, 1 in 10,000 solution for mucous surfaces.[27])

DEATHS FROM COCAINE SUBSTITUTES.

It must be remembered that occasional severe and even fatal accidents have occurred with all the cocaine substitutes that have been extensively used.[26] The preliminary report of the American Committee on Toxicity of Local Anaesthetics contains a table of recent fatal cases[33]:

	Deaths.
Stovaine	1
Alypin	1
Novocain	3
Novocain and cocaine	10 (*a*)
Apothesin	4
Butyn	4 (*d*)
Butyn and cocaine	1 (*b*) (*d*)
Cocaine	18 (*c*)
	42 deaths

(*a*) Presumably injection of novocain after painting with cocaine.
(*b*) Injection of butyn after painting with cocaine.
(*c*) Fifteen of these included and analysed above.
(*d*) See below, "Butyn."

This table possibly bears some relation to the frequency of use of the different drugs.

STABILITY OF COCAINE.

Cocaine base in solution is said to be very unstable. The hydrochloride in moderately strong solution is stable, unless it becomes alkaline. A specimen, containing 1/2 per cent. salicylic acid, was found, after two years in a stock bottle, to be of the same anaesthetic power and toxicity as a fresh specimen. This same solution, although doses had been frequently taken from the bottle without precautions, was sterile.[28] Cocaine hydrochloride can be sterilized by boiling;

it is not damaged by short boiling in the absence of alkali. (N.B.—Some glass is alkaline.[31])

De Havilland Hall pointed out in 1888 that alkali increased the efficiency of cocaine.[29] Recent experimental work shows that on mucous surfaces the anaesthetic power is doubled, the toxicity remaining unaltered, by alkalinization.[30] This does not apply to injected cocaine. The solution must be prepared at the time of use.

EXPERIMENTAL COMPARISON OF LOCAL ANAESTHETICS.

Experiments are being made in the Pathological Laboratory of Bristol University* on rabbits, guinea-pigs, and mice, with cocaine, novocain, stovaine, alypin, butyn, and atoxodyne.

The particular questions, among others, to which an answer is sought, are:

A. To what extent does the safety of these anaesthetics vary with (1) concentration of drug; (2) manner of administration; (3) presence of adrenaline?

B. Why do experimental and clinical estimates of comparative toxicity of various local anaesthetics differ?

C. Has the answer to B a bearing on the application of experimental results to clinical work?

D. What is the experimental toxicity of butyn and of atoxodyne?

These notes indicate briefly the results so far obtained; experimental investigation is proceeding.

Comparative Toxicity.

Comparative toxicity was estimated by a determination of the lethal dose by subcutaneous injection. As an example, the following abridged protocol is given:

No. 50.—Rabbit, 1.95 kilos; injection of 0.95 c.cm. of 20 per cent. solution of alypin = 190 mg. = 98 mg. per kilo.

Time (minutes).

5	.....	Weakness of limbs, coarse twitching.
9	.....	Urgent dyspnoea, pupils dilate.
11	.....	Lying on side, weak convulsion.
44	.....	Flaccid paralysis.
72	.....	Apparently moribund.
98	.....	Condition improving.

Later the animal was quite normal.

Result: Severe toxicity; recovery.

Minimal Lethal Dose.

From a series of such results the minimal lethal dose for the drug by subcutaneous injection at a given concentration, for each species, was determined. Thus, for example, the toxicity of cocaine in guinea-pig (subcutaneous 5 per cent. solution) was as follows:

No.	Dose in mg. per kilo.	Result.
59	30	Severe toxicity; recovery.
60	35	Severe toxicity; recovery.
64	40	Very severe toxicity; recovery.
65	45	Death in ten minutes.
58	50	Death in eight minutes.

Therefore the M.L.D. = 45 mg. per kilo.

Having thus determined the M.L.D. for each animal, with each drug, using the same concentration of each drug with any given species, a comparison of their experimental toxicities can be made and expressed as a fraction of the toxicity of one, say cocaine, taken as the standard. Of course, the higher the M.L.D. the lower must be the toxicity.

Comparative Experimental Subcutaneous Toxicities.[42]

	Mouse.	Rabbit.	Guinea-pig.
Cocaine	1	1	1
	[M.L.D. = 80	100	45]
Novocain	1/8	1/8	1/11
Stovaine	1/9	1/5	1/3–
Alypin	3/4	1–	2/3
Butyn	2	1½	3/4
Atoxodyne	1/10	.....	1/12

Concentration.

The effect of concentration was investigated—for example, cocaine given subcutaneously to rabbits.

20 per cent. solution ... M.L.D. = 100 mg. per kilo.
4 per cent. solution ... M.L.D. = 110 mg. per kilo.

A further variation when these limits are exceeded, and a similar result with novocain and alypin, is indicated by experiments not yet complete. Butyn does not appear so much influenced in its effects by concentration of the injected solution.

* For this my thanks are due to Professor I. Walker Hall.

Inasmuch as a large amount of experimental work has been done with concentrations of drugs greatly exceeding those used clinically, unless the effect is approximately the same with all drugs an allowance must be made for this.

Influence of Adrenaline.

The influence of adrenaline was investigated by injecting a hyper-minimal lethal dose of anaesthetic; and at the same time adrenaline of a strength of 1 in 5,000 (*a*) together, (*b*) in separate sites. For example:

No. 75.—Rabbit, 2.54 kilos. Injection of 7 c.cm. of 4 per cent. solution of cocaine hydrochloride containing 1.1 mg. adrenaline. Dose of cocaine = 110 mg. per kilo. Result: Severe toxicity; recovery.

No. 79.—Rabbit, 1.95 kilos. Injection in two sites of 4.30 c.cm. of 1 in 5,000 adrenaline and 5.40 c.cm. of 4 per cent. solution of cocaine hydrochloride. Dose of cocaine = 110 mg. per kilo. Result: Death in nine minutes.

From these experiments one may deduce that the presence of 1 in 5,000 adrenaline lowers the toxicity of subcutaneous cocaine. With strong solutions of anaesthetic the effect is not well shown. Other anaesthetics are being investigated.

Toxicity by Surface Absorption (Nasal Mucosa).

The effect of applying these anaesthetics to the nasal mucous membrane was examined by gently smearing hypolethal doses on the nasal passages of rabbits. It is possible that some of the solution was swallowed. Only one nostril could be used, or the drug got blown out; the nostril investigated was closed with a finger. The results of some experiments can be tabulated thus:

Drug.	Dose given by Nostril (mg. per kilo).	M.L.D. subcutaneous (mg. per kilo).	Result.
Cocaine	90	100	Death in three minutes.
Cocaine and adrenaline	90	100	Death in fourteen minutes.
Alypin	60	110	Death in six minutes.
Butyn	70	60	Severe toxicity; recovery.

In these experiments strong solutions were used, and it is probable that the factor of relative solubility has a large place in the results. At least, however, with cocaine and alypin strong solutions applied to the nasal mucosa of rabbits appear not less toxic than subcutaneous injections.

Clinical Toxicity.

The clinician estimates toxicity by the dose that exposes his patient to risks of serious central nervous disturbances—for example, syncope, dyspnoea, etc. Such a dose is less than the lethal dose, but with each species, each anaesthetic, possibly each variation in concentration, this dose, which we may call the "maximum clinical dose," may be a different *fraction* of the M.L.D. Let us call this fraction the danger ratio. Dixon[41] investigated the toxicities of cocaine in animals, using convulsions as his standard: he found a series of values quite unlike those from M.L.D. But, although in man syncope, etc., is produced by a smaller dose than are convulsions, we may use the latter phenomena as an indication in animals of the effects produced by hypolethal doses. Working on these lines we find that the "danger ratio" with different anaesthetics is:

Cocaine	Small.
Novocain	Moderate.
Alypin	Moderate.
Butyn	Large.

That is to say, *a small fraction of the lethal dose* of cocaine may produce syncope, while *a larger fraction of the lethal dose* of butyn is required.

Idiosyncrasy.

The "maximum clinical dose" of cocaine appears to be about 1/8 M.L.D.—that is, about 3 grains for an average adult man.* It is perhaps because of this low value of its danger ratio (1/8) that cocaine has been attacked on the ground of idiosyncrasy. Many clinicians, habitual users of cocaine, have worked with injections of about this dose. Possibly for the same reason reported cases of fatal poisoning from the clinical use of cocaine are rare.

* By injection.

Application of Experimental Results.

If the thesis as to danger ratio is established, when we wish to apply our animal experiments in the clinic it seems clear that we must know approximately what is the ratio for a given drug with the higher mammals. Further, an anaesthetic with a low danger ratio is much safer for trial than one with a high, the risk of incautiously approaching the lethal dose being less.

Butyn.[38]

Experimentally butyn appears, in the hands of four independent workers, to be of toxicity equal to cocaine or rather more toxic. Many of the experiments were done with strong solutions, and there seems some evidence that with weak solutions the toxicity of butyn is less reduced than that of cocaine—that is, its relative toxicity is greater. It is said to have special advantages in eye work.[39] In the nose it seems an effective anaesthetic, but more irritant than cocaine.[40] By courtesy of the proprietors I have received notes of five deaths following its clinical applications: two for septal resection—5 per cent. solution on tampon; two for tonsil operation*—1/4 per cent. solution injected—no evidence of overdose; one case of definite overdose. Obviously considerable caution is required in using it.

Note on Atoxodyne.

The claim of this anaesthetic to be without toxicity was found to have no foundation: the toxicity is low. It appears useless on mucous surfaces.

Summary.

1. The toxicity of various local anaesthetics was compared experimentally by determining the minimal lethal doses.
2. The effect of dilution was found to be a lowering of toxicity.
3. Addition of adrenaline definitely lowered toxicity.
4. It appears that the dose of anaesthetic which will produce alarming symptoms is with different drugs a different fraction of the M.L.D., cocaine having a small fraction, for example, butyn a larger.
5. Caution is required in using butyn.

REFERENCES.

[Few references to the non-fatal cases have been included. It has not been practicable to verify the references marked *.]

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* Cocaine was painted on fauces in one case.

A British Medical Association Lecture

ON

THE PATHOLOGY OF GASTRIC ULCER.

DELIVERED TO THE DERBY DIVISION, MAY 18TH, 1923,

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(Continued from page 957.)

PART II.—PATHOLOGICAL OBSERVATIONS ON GASTRIC AND DUODENAL ULCER.

THE statistical data utilized in this section were obtained from two sources: (*a*) a consecutive series of 6,800 autopsies at the Leeds General Infirmary, of which a special group of 1,500 were intensively studied from the point of view of gastro-duodenal pathology, and (*b*) a series of 120 stomach specimens removed at operation and submitted to microscopic examination.

A. INCIDENCE OF PEPTIC ULCER.

In the intensively studied series of 1,500 autopsies there were 130 cases of gastro-duodenal ulceration (that is, 8.7 per cent.) equally distributed between the two organs (4.5 per cent. in each). In 28 cases (1.9 per cent.) chronic gastric ulcers were present, and in 58 (3.9 per cent.) chronic duodenal. In the full series of 6,800 autopsies there were 150 cases with chronic gastric ulcer (2.2 per cent.) and 200 with chronic duodenal ulcer (2.9 per cent.). The relative frequency here shown (3:4) differs considerably from that revealed by clinical statistics. Sir Berkeley Moynihan's (1923)[23] latest review of 718 cases coming to operation shows duodenal ulcer to be three times more frequent than gastric, while in the Mayo Clinic figures (C. H. Mayo, 1920)[29] for 5,723 cases the ratio is practically 4:1. This discrepancy between autopsy and clinical statistics may be due to the surgeon *seeing* a relatively larger proportion of duodenal ulcer cases, which would suggest that, symptomatically, this is the more severe disease, or it may be due to the fact that gastric ulcer is the more difficult to diagnose, with the result that fewer cases come to operation. On the other hand, the partiality may lie with the autopsy figures. Gastric ulcer is the more serious and more fatal disease, with a much heavier operation mortality; a larger proportion of the duodenal cases, therefore, will recover.

The scars of healed ulcers are met with fairly frequently. In the series of 1,500 autopsies, 42 cases (2.8 per cent.) showed gastric scars, and 36 cases (2.4 per cent.) duodenal. Coincident *chronic* lesions (ulcers or scars) of the stomach and duodenum were met with in 7 cases, or 0.45 per cent. of the whole, but in only a single instance did an open chronic ulcer coëxist in the two organs.

B. AGE AND SEX INCIDENCE.

Acute ulcer of the stomach and duodenum occurs with a fairly uniform frequency throughout the decades, except that it is rather less common under 20. Chronic ulcer is rare under 20, only 1.5 per cent. of all cases coming to autopsy in the first two decades. In the present series 90 per cent. of cases of chronic gastric ulcer came to autopsy between the ages of 30 and 69, while the corresponding figures for chronic duodenal ulcer and cancer of the stomach were 84 per cent. and 96 per cent. respectively

The older statistical tables (Bolton, 1913[1]) show for the most part the heaviest incidence of gastric ulcer (acute and chronic) between the ages of 20 and 40. In this series the highest figures are found between the ages of 40 and 60—namely, 42 per cent. of all acute ulcers and 56 per cent. of chronic.

Chronic gastric ulcer shows a slight difference in the age incidence in the two sexes, being met with rather later in life in males. This is well shown by the fact that, whereas in females only 7.5 per cent. of ulcers occur at age 60 or over, in males the proportion in these later decades is 23.5 per cent. In both sexes the heaviest incidence is in the fifth and sixth decades—52 per cent. in males, 62 per cent. in females.

In so far as chronic ulcer is concerned these figures are of only very limited value. The important point is to know the age at which gastric ulcer commences, and that, obviously, is a thing very difficult to determine. Most of the chronic ulcers in this series gave a history going back several years, many of them fifteen or twenty years. Perhaps if all the figures for chronic ulcer were moved back a decade, the result would not be far from the truth.

With regard to sex, my own figures show that chronic gastric ulcer occurs with slightly greater frequency and chronic duodenal ulcer six times more frequently in men than in women. Sir Berkeley Moynihan's (1923)[23] clinical statistics show that chronic gastric ulcer occurs with equal frequency in the two sexes, and chronic duodenal ulcer four times more frequently in men than in women.

C. Morbid Anatomy and Histology.

[The lecture was illustrated with photographs of gross specimens, and with a series of histological sections mounted on lantern slides.]

On morbid anatomical grounds, both naked-eye and microscopic, it is possible to subdivide the ulcers of the stomach, and to a less extent those of the duodenum, into acute, subacute, and chronic varieties. The chief grounds of histological differentiation are the presence or absence of fibrosis, whether in the floor or in the margins of the ulcer, and, if present, its amount and characters. In the separation of non-inflamed acute ulcers and callous non-reacting chronic ulcers this may be almost the only distinguishing feature, but in active ulcers there are other histological criteria. An active acute ulcer in all but the earliest stages shows a zone of neutrophil polymorphic infiltration in its floor, sometimes extending a considerable way downwards from the necrotic surface. This is often accompanied by a certain amount of oedema, especially of the submucosa. It must be remembered, of course, that chronic ulcers are liable to acute exacerbations, which usually take the form of localized activity at a certain point or points of the margin or floor. Such foci will show neutrophil polymorphic reaction, but it will be superimposed on an obviously chronic lesion, and will not be so uniformly distributed as in acute ulcer.

In addition to fibrosis, chronic ulcers nearly always show foci of lymphocytic infiltration, usually in relation to small blood vessels. A certain number of plasma cells may be mixed with the lymphocytes, but these cells are not usually abundant except sometimes in the mucosa and submucosa at the margin. Infiltration of the floor of subacute and chronic ulcers by eosinophil leucocytes is common, and in a few cases reaches a high grade of intensity. Even in acute ulcers a few eosinophils may be present, but they are seldom conspicuous.

The state of the vessels in the floor of an ulcer, and beyond it, may be of help in differentiating acute and chronic. In acute ulcers the small vessels implicated in the disintegrative process are often seen to be filled with thrombi or fibrinous plugs, and even vessels of larger size may be so affected, especially if they have been ulcerated into. This is often found—for example, in cases where there is a history of haemorrhage a few days before death. In the floor of a chronic ulcer similar changes may be found, but in addition there is often well marked endarteritic and endophlebitic thickening, due to intimal proliferation. Sometimes this is associated with thrombotic obliteration of the remainder of the lumen, and sometimes with complete organization and canalization of the thrombus. Similar vascular changes are often seen on the peritoneal aspect of gastric scars.

1. *Acute Ulcers.*

These are usually multiple, especially in the stomach. In a series of 46 cases of acute gastric ulcer, 6 only were single. Both in stomach and duodenum they tend to be widely and irregularly distributed, with the exception that in the stomach they are usually most abundant in the pyloric half. They vary in size from tiny superficial erosions of the mucosa to large and deep ulcers measuring an inch or more in diameter. The great majority, however, are under half an inch in diameter, and most are under a quarter of an inch. In general it may be said that the more numerous the ulcers the smaller their size. I am convinced that there is no dividing line between what have been called multiple haemorrhagic erosions and acute ulcers of larger size.

Acute ulcers are usually described as presenting a punched-out appearance, and this is equally true of both large and small varieties. As regards depth, most acute ulcers, and practically all multiple small ones, are quite shallow, confined to the mucosa, or at most the mucosa and submucosa. In the earliest stages, as seen in the *post-mortem* room, there may be almost no excavation, a quite superficial necrotic lesion with slightly reddened margins being situated on a very slightly raised and thickened patch of mucosa. Later, as the ulcer deepens, tiny vessels are exposed in the floor, which then very frequently becomes covered by a thin black layer of altered blood, or of slough infiltrated with blood. Later still, preparatory to healing, the black slough separates, leaving a clean smooth floor, in which all haemorrhage has ceased, as a result of thrombotic obliteration of the little exposed vessels. In the duodenum the slough in the floor of acute ulcers may be black and haemorrhagic, as in the stomach, but if not it tends to be bile stained. Here also there is often slight oedematous thickening around and beneath the ulcer.

Acute ulcers of larger size which are tending to penetrate the stomach wall present the well known "terraced" appearance, due to the fact that the muscular coat is penetrated over a smaller area than that occupied by the original mucosal ulcer. If the peritoneal coat should perforate, this again usually takes place over a still smaller area, and a third step is added to the terrace. The perforations in the various coats may be concentric or excentric. In my experience acute perforating ulcer of the stomach is rare. In 6,800 autopsies there were but 8 examples, of which 6 proved directly fatal—3 by perforation, 2 by haemorrhage, and 1 by mesogastric cellulitis.

Acute ulcers tend to heal readily, and if they involve only the mucosa and submucosa may do so without leaving a permanent scar. If the muscular coat is involved a certain amount of fibrosis will take place therein and a permanent scar result. In acute penetrating ulcers which heal—probably a very rare event—the permanent scar in the muscular coat will be visible from the peritoneal as well as the mucosal aspect. In a certain proportion of cases one ulcer, rarely more, fails to heal with the rest, persists, enlarges, and becomes first subacute then chronic.

2. *Chronic Ulcers.*

In the stomach chronic ulcers are almost invariably single. In a series of 150 cases coming to autopsy there were only 3 in which two independent chronic ulcers co-existed. It is not uncommon, on the other hand, for a chronic ulcer to be accompanied by one or more acute ulcers, a fact which is of importance in relation to the well known recurrent character of the symptoms in these cases. In the duodenum double chronic ulcer, anterior and posterior, is fairly common. In a series of 200 cases coming to autopsy there were 32 with double ulcers. Here also acute and chronic ulcers may coexist.

The position of chronic gastric ulcer is well recognized. The great majority occur along the lesser curvature or in close proximity to it, and especially in the pyloric three-fifths. On the other hand chronic ulcer is rarely seen exactly on the pylorus, and it is by no means common within an inch of it. I have analysed a series of 125 cases coming to autopsy in which the exact position of the ulcer was noted, and find that no less than 90 per cent. occur along the course of the original gastric canal.

In considering the duodenum it has been thought advisable to take both ulcers and scars into account. In 1,500 autopsies there were 74 cases with chronic duodenal lesions, all within the first part of the viscus—namely, 23 with anterior wall ulcers or scars, 18 with posterior ulcers or scars, and 33 with double lesions. In practice it was found that invariably the ulcer or scar was wholly or mainly on the anterior or posterior wall, although large posterior wall ulcers were not infrequently found to have extended on to the superior or inferior wall or both. It is in these circumstances that perforation of a posterior wall ulcer is most likely to occur.

Chronic ulcers, especially of the stomach, are usually a good deal larger than the acute variety. In a series of 40 chronic gastric ulcers 17 were under 1 inch and 8 over 3 inches in diameter. In a corresponding series of duodenal ulcers 29 were under 1 inch and 11 from 1 to 2 inches in diameter.

The naked-eyed characters of a chronic ulcer vary very much according to the state it happens to be in at the time of examination—that is, according to whether it is active, callous, or healing. As compared with acute, chronic ulcers have thickened, rounded, and overhanging margins in the active state. In callous ulcers the margins are flatter, though still often undercut, while the healing ulcer has flattened margins, with the epithelium in most cases obviously growing inwards over the floor. In the active ulcer a narrow zone of sloughing with inflammatory exudation is almost invariably present in the floor, sometimes in patches, sometimes all over. It shows up as a narrow yellow or reddish-yellow line when the fresh ulcer is cut across, and in histological preparations it stains deeply. Microscopically it consists of an intensely eosinophilic structureless groundwork, with a zone of darkly staining nuclei, or nuclear débris, in its more superficial part. In places these are obviously the nuclei of polymorph leucocytes; elsewhere they are apparently pyknotic tissue-cell nuclei. In chronic ulcers which are the seat of an acute exacerbation this necrotic or necrosing layer is very broad and irregular, and beneath it the tissues of the ulcer floor are often much infiltrated by neutrophil polymorphs. The separation of the slough is a necessary preliminary to the healing of the ulcer, as Bolton has pointed out, its presence being an effective barrier to epithelialization. Ulcers in which ingrowing of marginal epithelium can be observed have always a clean smooth floor, at least in relation to the healing part. Callous ulcers resemble healing ulcers in this respect. Either the floor is clean and fibrous, or there is a very narrow zone of necrosis without much cellular reaction.

One of the most constant features of a chronic ulcer, whether of the stomach or duodenum, is penetration of the muscular coat. I have never seen a chronic ulcer in which the muscularis was not completely transgressed, although occasionally one of subacute type may only partially involve it. Perforation is prevented mainly by the great fibrous and granulation tissue barrier formed in the floor, less often by adhesions between the stomach and some adjacent viscus—pancreas and liver especially. Pads of fat, more or less fibrosed, are commonly found in the floor of gastric and duodenal ulcers. In the stomach this is seen chiefly in lesser curvature ulcers, where the fat is merely the adipose tissue of the gastro-hepatic omentum. In the duodenum, ulcers involving the posterior wall or encroaching on the upper or lower walls show it, not anterior wall ulcers as a rule. In other cases the pad of fat may be due to adherent omentum or to retroperitoneal tissue in the lesser sac to which the ulcer has become adherent. On the other hand, it is not uncommon to find both chronic ulcers and scars totally devoid of any such fatty mass on the peritoneal aspect.

Large ulcers of great chronicity may be associated with so much inflammatory thickening in and around them that a palpable tumour may be present in the epigastrium leading to an erroneous diagnosis of cancer. Even at operation it may be difficult, sometimes impossible, to distinguish. As a rule, however, the peritoneal aspect of a simple chronic ulcer is fairly characteristic. There is thickening and opacity of the serosa as a result of fibrosis and oedema, together with vascular congestion, often intense, and not infrequently areas of haemorrhage in cases where the ulcer is active. White radiating lines of fibrosis run out from the margins of the ulcer, and there is often a vascularized fibrous band of adhesion to some adjacent structure. The floor may show fine reddish stippling owing to the presence of numerous small, thin-walled vessels in the new-formed fibrous tissue, an appearance which may be brought out at operation by gently stroking the part with gauze (Scudder). In old, completely scarred ulcers the stippling, congestion, and haemorrhage disappear and the floor of the scar becomes white and sclerotic, and may show puckering. The shape of the ulcer crater also varies. In the stomach, in active ulcers of medium and moderately large size, it is usually deep and globular, or deep with a flat floor. Smaller ones are often similar, or may be slit-like, the mucosal margins almost meeting across the lesion. Very large ulcers, and especially callous ulcers, tend to be flat, with low, often undermined edges, and a smooth floor. Such ulcers are very frequently of the "saddle" variety, lying across, and at right angles to, the lesser curvature of the stomach. In these, as in very large posterior wall ulcers, whether gastric or duodenal, a part of the floor is usually formed by the pancreas. Healing ulcers, whether large or small, also tend to flatten out as marginal epithelialization progresses.

D. Healing of Gastric and Duodenal Ulcer and its Results.

The process of healing (Stewart, 1922[31]) is similar in acute and chronic ulcers. Following the cleaning up of the floor of the ulcer—that is, the separation of sloughs or purulent material, and the disappearance of bacteria—the epithelium at the margin starts to grow inwards, while at the same time, especially in chronic ulcers, the contraction of the fibroblasts in the floor causes the ulcer to become reduced in size. Acute ulcers heal rapidly, chronic ulcers much more slowly, not only because of their larger size, but also because of the large amount of dense fibrous tissue in their floor. At the same time there can be no doubt that even very large and very chronic ulcers may heal completely, while chronic ulcers of smaller size heal with very considerable frequency. The results of healing depend on several factors, especially the size of the ulcer, its chronicity and its situation. Ulcers related to the pylorus, whether primarily gastric or duodenal, need not be of large size to produce cicatricial stenosis. In the body of the stomach ulcers of small and medium size usually heal satisfactorily; it is only large ulcers which produce serious mechanical defects (hour-glass stomach). In the duodenum, ulcers within half an inch of the pylorus frequently implicate it, and those situated lower down lead to duodenal stenosis in a small proportion of cases. In a recent series of 29 cases with completely healed scars of chronic gastric ulcers—that is, scars involving the whole thickness of the muscular wall—21, or 72 per cent., had healed satisfactorily without resulting stenosis. The figures for duodenal ulceration and scarring are similar. Even if a chronic ulcer heals completely, there is always the possibility of a new chronic ulcer making its appearance in another part of the stomach. My own statistics show that this will occur in about 9 per cent. of cases.

There are two other ways in which the recurrent character of chronic peptic ulcer may be explained. It may be due to breaking down of the old scar, a process of which it is very difficult to adduce proof, or it may be due to chronic ulcer becoming callous and quiescent, with subsequent recrudescence of ulcerative activity. Of this, both surgeons and pathologists can bring forward convincing proof.

E. Complications of Peptic Ulcer.

The more important complications of chronic gastric and duodenal ulcer are indicated in the accompanying analysis of 350 fatal cases (p. 1024).

1. *Perforation.*

Perforation is the most serious and one of the most common complications of both gastric and duodenal ulcer. On the other hand, the figures given in the table are obviously no index of its frequency in all cases, since the great majority of perforated ulcers are admitted because of this accident. This swells unduly the proportion of perforated cases in these statistics.

Perforation takes place rapidly in the great majority of cases by the sudden sloughing of a part or of the whole of the peritoneal floor of the ulcer, this in turn resulting from a slow, progressive devascularization. The aperture, therefore, is usually of considerable size, from one-eighth to a quarter of an inch in diameter, and it is easily seen at operation, if in an accessible position, unless concealed by

Analysis of the Causes of Death in 150 Cases of Chronic Gastric Ulcer and in 200 Cases of Chronic Duodenal Ulcer.

	Gastric.		Duodenal.	
	Total Cases.	Per cent.	Total Cases.	Per cent.
A. Causes directly attributable to the ulcer	83	55.0	145	72.5
Acute perforation	55	36.5	118	59.0
Subacute perforation	3	2.0	4	2.0
Haemorrhage	12	8.0	19	9 5
Carcinomatous change	6*	4.0	0	0.0
Effects of long-standing obstruction	4	2.5	0	0.0
Miscellaneous and doubtful ...	3	2.0	4	2.0
B. Post-operative death	39	25.5	20	10.0
Peritonitis	10	6.5	1	0.5
Haemorrhage	2†	1.5	1‡	0.5
Bronchopneumonia	10	6.5	11	5.5
Other pulmonary complications	6	4.0	2	1.0
Shock	3	2.0	0	0.0
Dilatation of stomach	2	1.5	0	0.0
Jejunal ulcer	0	0 0	2¶	1.0
Miscellaneous and doubtful ...	6	4.0	3	1.5
C. Cause of death not related to ulcer	23	19.5	35	17.5

* Seven other ulcers showed carcinomatous change.
† Intragastric haemorrhage after partial gastrectomy.
‡ Haemorrhage from gastro-enterostomy operation wound.
¶ One died from haemorrhage from the ulcer and one from leakage and peritonitis.

plastic exudate or adhesions. In the stomach the perforation is usually on the anterior wall and close up to the lesser curvature. In the present series of 150 cases 58 were perforated. In 81 per cent. of these the perforation was on the anterior wall, in 15.5 per cent. on the posterior, and in 3.5 per cent. on both. In the duodenum perforation is even more common. It was present in 122 cases out of 200 which came to autopsy, and in the great majority of these it was an anterior wall ulcer which had perforated. Of the anterior wall ulcers 80 per cent. had perforated, and of the posterior only 9 per cent.

The results of perforation vary with the size of the aperture and its position, and according to whether or not the stomach is empty at the time of the catastrophe. The rapid extravasation of a large quantity of stomach contents through an anterior wall perforation will result in a rapidly fatal peritonitis. The slow oozing of infected material allows time for a certain amount of limiting plastic peritonitis to occur, and the peritoneal abscesses so formed may track in various directions, up under the liver or diaphragm, including abscesses due to perforation into the lesser sac, or down into the lower abdomen or pelvis. Such localized abscesses may rupture into the general peritoneum at any stage, or, rarely, they may perforate into pleura or pericardium, through the anterior abdominal wall, or into an adjacent hollow viscus.

2. *Haemorrhage.*

Though much less frequent than perforation as a cause of death, this remains, in its severe form, one of the most serious complications of gastric and duodenal ulcer. In fatal cases the bleeding is generally found to originate in a chronic ulcer, and very often the open end of an artery may be seen in the floor. In the present series of 6,800 autopsies 33 deaths from ulcer were due to haemorrhage. In 13 of these the ulcer was gastric (12 chronic, 1 acute); in 20 duodenal (19 chronic, 1 acute). In the stomach it is usually a branch of the coronary artery, or the splenic or gastro-epiploic artery, which is the source of the haemorrhage, in the duodenum the pancreatico-duodenal. In a few cases the haemorrhage comes from some adjacent viscus, liver and spleen especially, which has been penetrated by the ulcer. In the duodenum profuse haemorrhage is almost invariably due to ulcer of the posterior wall; in the stomach to ulcer of the posterior wall or lesser curvature. When bleeding is profuse there is usually haematemesis, irrepective of whether the blood is of gastric or duodenal origin, and melaena makes its appearance very soon after. If the bleeding is slight, melaena without haematemesis will result.

3. *The Development of Malignant Disease.*

The relation of gastric ulcer to carcinoma is one of the problems on which there is greatest diversity of opinion. Most pathologists consider that cancerous transformation of a simple chronic gastric ulcer is comparatively infrequent (Ewing, 1918,[32] suggests 5 per cent. as a maximum figure), most British and American surgeons that it is a very common event (54 to 71 per cent. according to the Mayo Clinic—Mayo, 1908,[33] Wilson and McCarty, 1909[34]). No doubt on this point *post-mortem* observations are apt to be fallacious, for the reason that the destructive effects of cancer of the stomach by the time the patient has come to autopsy may be such that the original simple ulcer has become completely destroyed. My own conclusions therefore are drawn from operation specimens only, and of these I have microscopically examined 120. The histological criterion on which ulcer-cancer cases was decided was the association in the same ulcer of an undoubted area of carcinoma with a portion which was definitely simple, and whose densely fibrous floor, devoid of cancer cells, replaced the muscularis. Suffice it to say that 10 per cent. of the cases of simple chronic ulcer coming to operation had developed cancer in the ulcer, and that in one-half of these the malignancy was unsuspected at the time of operation. Most cancerous ulcers of the stomach are, in my experience, primary cancers which have undergone central ulceration, and not simple ulcers which have become malignant.

The extraordinary rarity of duodenal carcinoma in contrast to the high ulcer incidence has long been the subject of comment, and it is often quoted as evidence against the view that chronic ulcer bears an important etiological relationship to carcinoma of the stomach. In the present series of 6,800 autopsies there were 150 cases of cancer of the stomach and only one case of primary carcinoma of the duodenum.

4. *Jejunal Ulcer.*

This serious and important complication of the operation of gastro-enterostomy has been of comparatively infrequent occurrence hitherto. A recent estimate by Sir Berkeley Moynihan (1923)[35] is that the incidence does not exceed 2 per cent., but it seems likely that further experience may show a higher figure. In the present series of 6,800 autopsies there were 16 cases in which gastro-enterostomy had been performed at periods varying from nine months to twelve years before, and in 3 of these jejunal ulceration was present. In 18 cases where an interval of from ten days to two months had elapsed since the operation, there was one case of jejunal ulceration. In each of these 4 cases the original operation had been for duodenal ulcer, and this is in keeping with clinical experience. The fact is no doubt related to the much greater degree of hyperchlorhydria present in this disease. In two of the cases death was directly attributable to the jejunal ulcer.

Jejunal ulcers may be acute or chronic, single or multiple, and they are similar in their naked-eye and microscopic characters to peptic ulcers of the stomach and duodenum. They are most common on the convexity of the jejunal loop—that is, at a point directly opposite the gastric stoma—or in the first inch or so of the efferent channel. They also occur not infrequently on the gastro-jejunal suture line—gastro-jejunal ulcer. They may cause death by perforation or haemorrhage, and apart from a fatal issue may be responsible for a return of gastric symptoms, often in an

aggravated form. Rarely they perforate into the transverse colon with resulting gastro-colic fistula.

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British Medical Association.

PROCEEDINGS OF SECTIONS AT THE ANNUAL MEETING, 1923.

SECTION OF SURGERY.

Sir HENRY M. W. GRAY, K.B.E., C.B., C.M.G., F.R.C.S.Edin., President.

DISCUSSION ON THE TREATMENT OF ACUTE PRIMARY INFECTIONS OF THE HAND.

INTRODUCTORY PAPERS.

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THE importance of this subject, whether viewed from a medical or from an economic standpoint, can hardly be exaggerated, and I can imagine no better subject for discussion at a meeting such as this. Here we deal with the wide problems of infection, resistance, and immunity; we endeavour to crystallize our views on the principles governing our treatment of infection in both its general and local aspects, and withal, we deal with a subject of everyday importance to the practitioner of medicine. In hospital practice there is often an unfortunate tendency to regard infections of the hand as belonging to the realm of minor surgery, to be dealt with by the less experienced members of the staff; yet no cases present more difficult problems for decision, and not infrequently the life of the patient may depend on the line of treatment which is adopted. The majority of such infections are met with in the robust, wage-earning class of the community, and the difference between the rapid restoration of a hand to early and full function and the prolonged, tedious, and crippling course of the neglected or maltreated case is one of far-reaching economic import.

In the first place we must look at certain fundamental pathological considerations. The introduction of pathogenic micro-organisms into the tissues is followed by certain reactive changes, both general and local. The response by fever with its heightened metabolism, the increase in the circulating phagocytes in the blood stream, and the production of antibodies we recognize as part of Nature's effort at protection. At the seat of infection we find a reactive hyperaemia, an outpouring of lymph, and an aggregation of phagocytic cells—a local endeavour to destroy or wall off the invading germs and prevent their entrance into the blood stream. We now regard these changes as essentially protective, and we endeavour to aid and to reinforce them by such means as we possess. We know, however, that in the hand in particular the outpouring of lymph and the death of many of the phagocytes is apt to lead to an accumulation which, in certain areas, is limited as to available space, so that dangerous tension may ensue and the vascular supply and the vitality of the part may be threatened. Further, the concentrated toxins of the infecting bacteria, together with the proteolytic ferment liberated from the dead and dying phagocytes, tend to the death and liquefaction of the surrounding tissue cells. From such an area there will be absorption of the bacterial toxins and proteoses which will have a profound and deleterious influence on the bodily economy.

The sphere of active surgical interference is the provision of drainage of such areas of suppuration and tension, and that before irreparable damage has occurred. It is essential, therefore, that we have clear ideas as to the types of infection met with, and, in the case of the suppurative variety, the sites at which pus is liable to accumulate and the routes by which it may spread.

Following on extensive inflammation, and especially on that associated with suppuration, is the inevitable fibrosis, fixing tendons, binding muscles, stiffening joints, compressing nerves and vessels, so that a limb may be helplessly crippled in every constituent part of its functional apparatus. It is essential that we bear this in mind when we are in doubt as to the necessity for what seem to be ruthless incisions. The disability following an unnecessarily extensive incision is as nothing compared to that following a burrowing, liquefying, and prolonged suppuration. Moreover, in our after-treatment it is of paramount importance to anticipate and to prevent the fixation of mobile parts by unyielding fibrous tissue, and to remember that the preservation of tissue without function is a mere waste of time and energy.

ANATOMICAL CONSIDERATIONS.

Certain points in the anatomy of the hand and digits have an important bearing on the course and spread of infection. First, the lymphatic network in the hand is very full and free, particularly on its palmar aspect, whence lymphatic trunks come to the forearm, mainly by way of the dorsum.

Secondly, the cellular tissue is divided into spaces by septa which serve to localize or guide the spread of infection. In the pulp of the digits—that is, the soft part on the palmar aspect of the terminal phalanges—dense, fibrous septa, extending down to the periosteum of the phalanx, enclose the fatty tissue, and infection of this tissue leads to great tension with necrosis, which is very apt to involve the bone. In the palm of the hand we have the deep cellular spaces so clearly demonstrated by Kanavel, of which the two most important are the middle palmar and the thenar spaces. Situated deep to the dense palmar fascia and the long tendons, and just in front of the interossei muscles, a collection of pus in the former space will point along the lumbrical muscles of the third, fourth, and fifth digits; in the thenar space it will tend to point to the radial side of the index finger. A knowledge of the existence and the boundaries of these spaces will enable us to recognize and drain a collection of pus in either or both of them before irretrievable damage has been done to the hand.

Thirdly, the tendon sheaths have an anatomical arrangement which, although not constant, is sufficiently regular and well known to require no elaboration here. An accumulation under tension in a tendon sheath will, besides endangering the vitality of the enclosed tendons, tend to rupture either into one of the palmar spaces or, in the case of the little finger and thumb—the ulnar and radial carpal bursae—into the deep cellular planes of the forearm underneath the flexor communis digitorum. In the fingers these tendon sheaths have such intimate relationship to the first interphalangeal joints, that infection of these joints is a common sequel to an infective teno-synovitis.

TYPES OF INFECTION.

Two main types are met with—the one the lymphatic, the other the suppurative infection. The latter may be subdivided into that involving the cellular tissues of fingers and hand, and that involving mainly the tendon sheaths. Infection of bones or joints is almost always secondary and will be considered as a complication.

Lymphatic Infection.

This is given first place because it is the type of infection in which the life of the patient is seriously threatened. The infection, usually gaining entrance by a prick or scratch, leads within a few hours to a local congestion, associated with red lines up the arm, some swelling of the axillary lymph glands, and definite constitutional symptoms characterized by a rigor, rise of temperature, and malaise. The infecting organism is almost invariably the streptococcus, and the danger of septicaemia is a very real one. There should be little difficulty in distinguishing this type from the other infections of the hand. It is vital that a correct diagnosis should be made, as the treatment of such infection is altogether different from that of suppurating whitlow.

Suppurative Cellulitis.

This may occur in any part of the hand, but there are two situations where it is specially liable to arise and where its early recognition is particularly desirable. One is in the tip of the finger, where the dense, unyielding fibrous septa may confine pus under tension and lead to extensive necrosis of soft parts and bone. The other is deep in the palm of the hand, where, encased by the dense palmar fascia in front and by the bones and interossei muscles behind, the pus may accumulate under tension until, forcing its way along the lumbrical canals, it appears at the roots of the fingers. While such cellular tissue infection may extend to and involve the tendon sheaths, it may, and frequently does, occur independently—hence the importance of recognizing it and draining it along anatomical lines.

In passing one must refer to the infection so commonly met with in the nail-fold. Commencing as a cellulitis round the roof of the nail and discharging between the fold and the nail, this infection may spread under the nail and require its total or partial removal, but more frequently it is troublesome in that it leads to a chronic discharging sore under the fold, if not treated on rational lines.

Tendon Sheath Infection.

This may begin as a primary infection of the sheath from a direct wound; more often, however, it is a complication of a lymphatic infection of a finger. In the early stages of infection the sheath fills with a turbid, glairy fluid which rapidly tends to assume the character of pus. Owing to the limited capacity for expansion the exudate rapidly accumulates under tension, which compromises the vitality of the serous lining and of the tendons enclosed within. An early rupture of the sheath might possibly save the tendons; more often, however, the latter necrose unless the infection be very mild or early surgical relief be given. In any case the injury of the serous lining is apt to be followed by fibrous adhesions, contracting the sheath and fixing it to the tendons within. The essential features of tendon sheath infection are the early development of tension and the precarious nutrition of the structures within the sheath.

Bone and Joint Infection.

Seldom primary, infection may, and often does, involve the phalanges and interphalangeal joints. The most frequent examples are the necrosis of the distal phalanx in finger pulp infection and the involvement of the first interphalangeal joint in cellulitis or tendon-sheath infection of a digit. The rapid destruction of the articular cartilage and the softening of the lateral ligaments determines a loss of function in the joint even should the infection subside.

DIAGNOSIS.

In no surgical condition is accurate diagnosis so essential for rational and successful treatment as it is in hand infections. For accuracy in diagnosis an intelligent knowledge of the pathology of such infections is indispensable.

In the first place we must decide which type of infection is present. Is it an acute lymph infection, not walled off but spreading by lymphatic paths and threatening dangerous septicaemia? The marked constitutional disturbance, the slight local swelling, the red lines up the arm, will seldom leave us in doubt. Is the infection a suppurative one involving cellular spaces but sparing the tendon sheaths? If localized to the tip of the finger with tense and tender pulp we immediately suspect suppuration, enclosed in the dense tissue in front of the distal phalanx. If there is marked swelling of a finger and of the hand we must decide whether or no a tendon sheath is involved or whether the suppuration is limited to cellular planes. A slight prominence of the palm with marked oedema of the dorsum of the hand makes us immediately suspect suppuration in the middle palmar space, the more so if a swelling is appearing in the cleft between the fingers. The uniform swelling of the finger, the flexed position, the pain on passive extension, and the exquisite tenderness when pressure is made over the proximal part of the palmar aspect of the finger, will leave little doubt that the tendon sheath is involved. It may be that the latter picture is combined with that of palmar space infection, and we recognize that an infected tendon sheath has ruptured into the palm. The swelling on the dorsum of the hand is seldom more than oedema, and will always make us search for evidence of pus in front. In the case of the thumb and little finger we may find the swelling extending to the wrist and forearm and we examine for evidence of suppuration in the radial or ulnar bursae, and possible extension to the deep cellular planes of the forearm into which the pus may have broken through. Finally, we determine whether there be signs of bone or joint involvement.

TREATMENT.

The worst infections of the hand usually start from small and trifling lesions, hence the importance of prophylaxis in the shape of prompt antiseptic dressing of all wounds in factories, workshops, and other centres of organized industry. For infections already established certain principles apply to infections of the hand:

1. Nature's effort to localize and restrict the spread of the infection must be aided and not combated.
2. Where the products of bacterial activity and tissue-cell death accumulate under tension, relief must be given by incision at the earliest possible moment.
3. Where spreading suppuration is present large incisions allowing of free drainage will cause less disability than smaller incisions with more protracted suppuration.
4. Rest to an inflamed part is an important factor in aiding speedy localization and resolution.
5. In a member such as the hand function means mobility, which, in its turn, depends on the smooth working of joints and gliding of tendons within their sheaths. While the first principle in treatment will therefore be the rapid arrest and localization of infection, this must be effected with the minimum of interference with the subsequent mobility and functional usefulness of the hand.

Treatment of Acute Lymphatic Infection.

No incision must ever be made at the point of infection in such a case during the early stages. Premature incision will increase the risk of septicaemia tenfold by opening up pathways which Nature is endeavouring to shut off by a leucocytic barrier. The principles of treatment must be to diminish absorption, to aid local resistance, to combat toxaemia, and, if possible, to give passive immunity. We encourage, therefore, hyperaemia locally by moist, hot applications, produce passive hyperaemia and delay absorption by applying Bier's elastic bandage to the upper arm, give fluid in large quantities by the mouth or rectum, and inject a large dose (50 c.cm.) of polyvalent antistreptococcic serum subcutaneously.

Considerable difference of opinion exists as to the value of Bier's congestion in hand infections. There can be no question, however, about its value in the acute lymphatic type of infection. I should put it first among therapeutic measures. Similarly, in regard to antistreptococcic serum, many are sceptical as to its value. My own experience has been that in many of these cases it gives great help, and

I consider that the treatment of an acute lymphangitis is not complete without it. In most instances no incision is ever required, but in an infection starting as the lymphatic type we may have secondary involvement with suppuration of the cellular spaces and tendon sheaths of the hand, when active surgical interference will be called for.

Treatment of Suppurative Cellulitis.

Early incision with free drainage is always indicated. In the finger pulp two lateral incisions will completely relieve tension, and, if made in time, will save the phalanx from necrosis. For deep suppuration in the palm an incision is made in a cleft between two fingers and a sinus forceps thrust in along a lumbrical canal. If this gives inadequate drainage the web of the finger may be split up into the palm. For suppuration in the thenar space through-and-through drainage of the first interosseous space is essential. Incisions on the dorsum of the hand are very seldom required, for the swelling of the dorsum rapidly subsides when the palmar collection is drained.

Treatment of Nail-fold Infection.

In the severe cases it may be necessary to throw up the nail-fold by a lateral incision at either side and remove part of the nail. As a rule, however, the pus will already have made its way out under the fold. The essential for rapid healing in such cases is to pack in strands of gauze between the nail and the fold by means of the blunt end of a straight sewing needle. This method, which I learned from Mr. J. W. Dowden, is one of the most useful and successful devices of minor surgery.

Treatment of Infective Teno-synovitis.

Free incision with adequate drainage is necessary at the earliest moment possible. For this, as for the operative treatment of all extensive hand infections, a general anaesthetic should be administered; otherwise inadequate drainage is all too likely. A tourniquet in the form of an Esmarch's bandage to the upper arm is advisable, for not only does the surgeon obtain a clear view of the infected region and its extent with a minimum of haemorrhage, but by leaving on a few turns of the bandage at the conclusion of the operation a suitable degree of passive congestion may be maintained and dangerous toxic absorption diminished.

The opening of infected tendon sheaths should err on the side of completeness, and no thought of subsequent scars should hamper one in providing the freest drainage. If necessary the anterior carpal ligament may be split in order to ensure no retention above it owing to adhesions. If the suppuration has extended into the forearm a lateral incision is made on either side, just in front of the bones, and a forceps thrust through, giving free exit to pus burrowing upwards under the anterior group of forearm muscles. It is a good rule to make all incisions sufficiently free to render the use of drainage tubes unnecessary. The less in the shape of foreign bodies introduced into the wounds the less will be the subsequent fibrosis.

After-Treatment.

Moist dressings and hot saline baths for the first few days should be the rule; they should be stopped, however, as soon as the acute inflammation has subsided, otherwise the tissues become soft and sodden, and resolution is delayed. In the case of cellulitis, rest should be instituted until the infection shows patent signs of becoming localized. Thereafter the sooner movement is encouraged and persevered in the better. In tendon-sheath infections the earlier the movement the fuller will be the ultimate function. With free incisions, passive and active movements facilitate drainage, increase the blood supply, and minimize adhesions. As the inflammation subsides systematic exercises should be carried out every day, and the patient encouraged to strive after a daily advance in the range of movement. To leave restoration of function until the wounds have practically healed is to delay and to compromise the ultimate utility of the land.

Complications.

When sloughing of the tendons in one finger has occurred the treatment to be adopted will depend on whether the patient is a manual labourer or no. If the former, then amputation of the finger should be resorted to. To save the finger is only to lose time, as a stiff finger is always in the way. There is, however, a time to amputate and a time to wait. An amputation during the stage of acute reactive cellulitis may lead to a flare-up with lymphangitis or spreading infection in the hand. It is always wise to wait until the acute inflammation is obviously on the wane before having recourse to amputation. In the case of patients who do not labour with their hands the finger should be preserved. The thumb is an exception to this rule and should always be preserved. The same rules should hold good when a joint is disorganized.

Summary.

Early accurate diagnosis is the crux of the management of hand infections.

For lymph infection without suppuration the treatment should be on essentially conservative lines.

For suppurative infection in tissue spaces or tendon sheaths prompt and free drainage with early systematic functional exercises should be the guiding principles.

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I THINK the opener has given a very clear exposition of the principles which should govern the treatment of these cases. I am glad he has emphasized their economic importance. A septic hand in a working man may easily lead to grave industrial disability, and I think all the more severe types ought to be treated as hospital in-patients during the acute period; it is the only way in which the all-important supervision can be obtained at this stage.

In regard to the opener's classification of types, I agree as to the clear distinction between what he calls lymphatic and cellular infections; but I think the term "lymphatic" so applied is misleading. There it is a common type of infection of the subcuticular layers of the skin which is frequently followed by mild lymphangitis and lymphadenitis. Such cases require careful local treatment by the complete removal of all undermined cuticle. Suppuration about the lymphatics or in the glands may occur later, but the constitutional disturbance is essentially mild. The severe cases are due to the inoculation of an unusually virulent strain of the streptococcus, and might be classified as fulminating streptococcal infections. In these cases little or nothing surgical can be usefully done in the first few days; the issue depends upon the patient's natural resistance to the bacterial invasion. This may be reinforced with antistreptococcal serum, but I think it is difficult to obtain crucial evidence of its value.

In the matter of the surgical treatment of cellulitis and suppurative teno-synovitis, the opener has given a clear outline of the anatomical points which should govern the position and extent of the incision. I think it important that the incision should be sufficiently free to allow it to gape. I do not think the tearing open of spaces with forceps is a sound practice in the presence of an acute infection. The surgeon's duty is to relieve tension and to inflict as little damage on the tissues as possible. I agree that the use of drainage tube or other foreign material is undesirable in theory, but in practice I pack the incisions for the first twenty-four hours with paraffin gauze in order to prevent the accumulation of blood clot and premature falling in of the margins of the wound.

The use of the tourniquet during operation on cases of this character has great conveniences, but it is not without its dangers. The experience of the war showed that the application of a tourniquet to a limb for an hour or two greatly prejudiced the course of an infected wound in the area which had been thus temporarily deprived of blood.

The dressing of wounds after incision for other conditions merits some consideration. Hot fomentations

are comforting to the patient, and may be allowed during the stage when great congestion is present. Their continued use brings the surrounding skin into an unhealthy sodden state, and predisposes to secondary infection of the wound. I think a dry sterile dressing, not too frequently changed, gives the best results in the resolving period. There is no doubt that the natural exudate is the medium in which defence and repair mechanisms work at their best. We have learnt this in regard to the peritoneum and the knee-joint, and may well apply the knowledge to the handling of acute infection in other parts of the body.

In regard to the restoration of function, I would draw attention to the importance from a prophylactic point of view of keeping the fingers partly flexed during the treatment of any palmar infection. This position will make it possible to break down or stretch adhesions which may form as healing proceeds. If the fingers are fixed in a fully extended position no subsequent passive movements have any power to mobilize adhesions which will inevitably form.

When healing is complete movements under an anaesthetic may be carried out with care. In some cases a brisk reaction is provoked, which defeats the aim of the procedure. I think the use of graduated splintage to restore the movements of the fingers in both directions is a better and safer method, though requiring more time and patience. I have seen considerable general improvement in the mobility of the hand result from the use of hot paraffin baths.

I agree with the opener that when the flexor tendons of a finger have sloughed out, or when an interphalangeal joint has been infected, amputation is usually justified. In a few cases in which the scarring is not very extensive tendon plastic work may be worth while. In my experience attempts at arthroplasty on the interphalangeal joints are disappointing in their results.

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THE ideal treatment of these conditions, as elsewhere in the body, is prophylactic. In the majority of cases the serious septic conditions of the finger and hand arise from minute wounds or punctures, which are, perhaps, naturally neglected until inflammation becomes manifest. It is, no doubt, asking too much that every individual who pricks his finger should at once seek medical advice; though the public are more fully aware now of the possibilities of such a prick, and there exists a more or less deep rooted faith in the application of iodine or some antiseptic. If no organisms of virulence have been introduced, this application will have given a certain confidence and moral support, and no ill effect will accrue; but should virulent organisms have gained an entry, severe results will follow. I would urge every surgeon or pathologist, who when operating on a septic case, or carrying out a necropsy, pricks his finger sufficient to draw blood, to have the minute wound excised (not incised) at once, and the arm immobilized on the largest splint possible, until everything is seen to be quiet. If the excision be done at once, the wound may be closed; there is no advantage in leaving it open.

Such treatment may appear excessive; I do not believe it to be so, since if sepsis does perchance gain a hold, at the least it will entail some weeks of "off duty," while it may result in the complete removal of an active worker from his duties for good.

If infection has already gained a foothold it may be spreading along the lymphatics, cellulo-cutaneous tissues, in the blood stream, or in all three without pus formation, or it may become localized and be accompanied by pus formation.

The first group of cases present much the more serious and difficult problem, and by whatever channel the inflammation spreads, it passes far beyond the fingers or hand from which it originated. While all cases in this group are serious, roughly they fall into two types—the first, in which, though there is evidence of a spreading inflammation, the constitutional disturbance is not excessive, and a second type in which the patient is ill out of all proportion to the local manifestations. In the first type, the value of immobilization of the whole affected limb cannot be overestimated; the splint used should be sufficient to ensure that this is complete. With the limb immobilized, and the patient at rest in bed, the natural defences are given their chance to localize the infection, and pus is liberated as it is formed. In the early stage, too, my faith has never wavered from the hot boracic fomentation, provided they are large enough and hot enough and aseptically applied, both as a means of producing hyperaemia and a comfort to the patient.

In the second type of case, when there are grave constitutional effects, when at the end of twenty-four to thirty-six hours from the first signs of infection the patient is seriously ill, it is probable we are dealing with organisms of extreme virulence or a patient with little or no resistance. In such cases not a minute is to be lost before relieving the areas of greatest tension by suitable incisions. Such incisions should not be indiscriminately placed, and should not open up the infected tissues which may be endeavouring to localize the spread.

Along the hand and arm the areas of greatest tension can as a rule be recognized and relieved by an incision which should penetrate the deep fascia. Such incisions, afterwards, can well be treated by Carrel's method of intermittent irrigation. The axilla presents a difficult problem. In these cases pain and throbbing is complained of in the axilla, and the glands are nearly always somewhat enlarged and acutely tender. These glands though under great tension, at the same time are an important line of defence. From the point of view of tension, as a source for further spread one may advocate that they should be excised, and that as a defence, though it is obviously an inadequate one, they should be left.

My own inclination is to leave the axilla untouched, chiefly because any excision would probably be incomplete, and it is impossible at the time to differentiate the useful from the harmful glands. Whatever operative procedure is carried out, afterwards, the whole limb must be completely immobilized. There is no doubt that in many instances serum is of the greatest benefit to these cases of generalized infection, but in my opinion it should not be relied on to replace the operative and splinting methods of treatment.

Fortunately, in civil practice it is rare to encounter a case of acute spreading gangrene; occasionally such cases occur, perhaps from injury to the hand, as a rule a severe one, and necessitate an immediate and high amputation of the limb as the only chance of saving life.

In the second group of cases, when the infection has become localized it will as a general rule be accompanied by the formation of pus. I should like to emphasize that the formation of pus is a kindly act and to be noted with relief; not that it means all danger is passed, but it does show that natural defences have been called into play and are offering some degree of resistance: pus is in itself harmless, except under tension. If pus has formed, it should be liberated by an incision to relieve the tension in that area. Such an incision should open up the extent of the abscess cavity, for which two or more incisions may be necessary, but it should not extend beyond the cavity, otherwise not only are the natural defences interfered with, but two new tissue planes are exposed to infection. Although relief of tension can be accomplished at the time, it is difficult to maintain. I am extremely doubtful of the value of so-called drainage tubes and gauze packing; on the whole, in my opinion they do more to defeat than attain the desired object. My impression is that so far the best method of maintaining relief of tension is the removal of areas of skin, subcutaneous tissue and fascia, or tendon-sheath if necessary—in order to produce a definite gap and not a cleft, the surfaces of which must needs be kept apart.

In inflammation or suppuration at the base of the nail, whether superficial or deep to the nail itself, the whole nail should be removed. Much time is often lost and suppuration prolonged by endeavouring to deal with these cases by incisions only or partial removal of the nail.

If there is infection of the terminal phalanx of a finger, an incision removing an area of skin should be made along the lateral aspect of the finger, extending over the tip of the finger to the top of the nail bed; the phalanx itself may be removed wholly or in part, but personally I am not in favour of this as a primary measure, since if the relief of tension can be maintained, it is possible that only a partial necrosis may result. If the whole finger is involved with sloughing of the tendons and general destruction, I think immediate amputation of the finger is indicated, since there is no object in maintaining an area of septic absorption which eventually is going to be a stiff and useless object.

Suppuration may spread from a finger or fingers into the palm of the hand. In the early stages this may be arrested by incisions on the palm between the bases of the fingers. When there is pus in the palm of the hand, however deeply placed, an incision or incisions must be made to open up the whole area of suppuration. This may necessitate division and ligation of the arterial arches, and opening of the carpal bursae, and if so, it must be opened to its full extent by dividing the anterior annular ligament of the wrist.

After any operative procedure for the evacuation of pus, the whole limb is again immobilized on a splint.

In the after-treatment I do not think it is advisable to resort to too frequent dressings; immersion twice a day in a bath of hydrogen peroxide or eusol will assist in the removal of débris and sloughs which may block the exit, but, provided there is sufficient opening, such débris will gradually be cast out.

Splints should not be discarded until all active spread, as indicated by the local condition, pulse and temperature chart, has been arrested, and it is only then that movements of the fingers are to be encouraged. During immobilization the wrist should be kept slightly extended, and the fingers in their natural position of rest—namely, in slight flexion.

Once a tendon or a bone has become infected, no treatment will prevent destruction of a part of such tissue; nevertheless such destruction can be limited by the prevention of further spread. Ultimate movement of the fingers will depend entirely on the degree of destruction of their component parts, and complete recovery is impossible if destruction has occurred. Limitation by soft adhesions only, whether in the joints or tendon sheaths, may eventually be overcome.

Such, very briefly, I believe to be the main principles of the treatment of septic infections of the hand. The slightest indication of inflammation is to be treated seriously, while treatment itself consists mainly in the wise use of a splint and a scalpel.

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I PROPOSE to confine my remarks almost entirely to the immediate treatment of acute infections of the hand and more particularly to acute infections of the fingers. The less precedes the greater. Efficient early treatment of whitlow will almost completely abolish those terrible spreading infections of the palm which are so tragic in their results.

My purpose is to offer you, very briefly, a definite scheme of treatment in place of the very vague and unsatisfactory teaching which most of us have received. As a student and a house-surgeon I was told that the correct treatment for a whitlow was to open it. As to when to open it or on what principle to decide how big an incision was to be made I was left to find out for myself. I am sure that my experience is that of most of you. Whitlow, which in its economic results is one of the most important of the surgical infections, has been passed over by our teachers in favour of other conditions more interesting and dramatic.

I think it is possible to lay down a rational basis of treatment which can be applied with suitable modification to almost all acute infections of the fingers and hand.

It is necessary, when considering the treatment of a condition which is liable to cause so much suffering and to leave so much disability in its wake, to have clearly in mind the essential features of the disease and a rational explanation of these features. With these as a basis, definite principles of treatment can be formulated.

The most striking feature of the disease is the frequency with which an infection beginning, apparently, in or immediately under the skin spreads to and involves bones, tendons, and tendon sheaths. This spread is a common complication of the cutaneous and subcutaneous infections of the hand—a very rare one in other parts of the body. To me this appears to be the essence of the problem.

What is the explanation? It is to be found, I think, in the anatomy of the hand and fingers.

The hand and fingers are made up of (1) a large bony skeleton, (2) a relatively large amount of almost avascular tendon, (3) skin which is closely applied to the bones, is thick and inelastic over much of its area, and is subdivided into small segments by numerous creases, (4) a very small amount of "soft parts" containing an unduly large share of dense fibrous tissue, the whole being richly supplied with arteries, veins, and lymphatics. These are the essential features of the hand when considered from the point of view of inflammation.

What happens when a finger becomes septic? The starting point is, let us say, a needle prick or a scratch on the terminal segment. This usually involves only the skin —sometimes it extends through the thick skin to the fat underneath—only very exceptionally is the bone or periosteum injured.

The usual phenomena of inflammation appear, pain being especially marked. Whilst the heat and swelling remain limited to the last segment the condition does not differ appreciably from any other superficial inflammation. In twenty-four or forty-eight hours, however, the inflammation spreads above the last crease and the second segment becomes involved in the swelling. The distal half of the finger is now swollen and distended to its full capacity and the tip of the finger is now no longer pink but cyanosed. This stage marks the complication of the inflammatory process by a new factor—that of strangulation. The blood flow through the end of the finger is being obstructed by the greatly increased pressure in the proximal portion of the finger. If this is allowed to persist thrombosis of the veins and lymphatics will follow and bring in its train death *en masse* of the more delicate constituents of the finger—that is to say, the bone and tendon.

The pressure to which inflammatory swelling subjects the vessels of the finger between the rigid bone and the tense hard skin is accentuated by another important point in the anatomy of the finger.

It is noteworthy that on opening a whitlow it is almost invariably found that the pus is limited in its upward spread at one or other of the phalangeal creases. It is unusual to find its proximal limit in the middle of a segment. This is because at these creases the skin is definitely attached by fibrous bands to the bone and consequently can stretch even less than elsewhere. As a result the creases have in the swollen finger the effect of constricting bands and are comparable in their action to the constriction at the neck of a strangulated hernia.

It is, of course, obvious that the process of strangulation we are considering is progressive. Inflammation of the terminal segment begets obstruction to the blood supply and consequently a weakening of the antiseptic processes and a proportionately increased virulence in the infection. Spread to the second segment follows—the same vicious circle is set up and the first segment in natural sequence becomes involved.

Spread from the finger to the hand may and does occur through the action of the same factors. Fortunately, however, the space in the hand between the skin and the bones is large enough to allow of considerable swelling before any injurious pressure is exerted, so that it is only in the worst cases that direct spread takes place.

Infection of the hand from the fingers is more commonly due to spread along the tendon sheaths. These sheaths are in the fingers exposed to all the effects of the strangulation process and indeed help to increase it since they early become distended with fluid. As soon as organisms gain access to this fluid, whether by gangrene of the wall of the

sheath or by direct spread through the wall, they have a direct path leading them into the palm.

Infection in the palm of the hand gives rise to precisely the same phenomena as in the case of the fingers, but on a larger scale. The area available for the inflammatory swelling is bounded by the metacarpals behind and the skin and palmar fascia in front, with the anterior annular ligament and the creases on the anterior aspect of the wrist as a double constriction ring above.

In sum, then, the peculiarities of inflammation in the fingers and hand are due to their special anatomical features which give rise in the presence of inflammation to a process of strangulation.

The principles by which treatment should be guided in accordance with the pathology which I have very briefly indicated are clear and simple: restore the circulation by relieving the constriction and drain the abscess.

I propose to confine my remarks on technical details of treatment almost entirely to infections of the fingers. They are far the most common variety of hand infections, they are the almost invariable precursors of the more serious infections, and their efficient treatment will largely prevent the spread of infection to the palm.

It is a truism that any septic infection of the palmar surface of a finger constitutes a grave disease either actually or potentially. Unfortunately the public and many of ourselves have not yet realized this fact. A patient in the acute and early stages of a whitlow should be as automatically confined to bed as is the man whose hernia has just become irreducible. The affected hand should be put to rest on a splint and should be slightly elevated to assist by gravity the return of fluid from the swollen part. It will be objected that this is a counsel of perfection and that patients will not submit to so much fuss over a simple "poisoned finger." The criticism is probably just in many cases, but the same objection with as good grounds has been raised in the past over the treatment of many other diseases and has only gradually lost weight as we have persisted in our views and educated our patients.

Unfortunately it is only exceptionally that we are consulted at a very early stage of the disease. In most cases pus has already formed before we see them, and in the minority its presence, if not certain, is at least very probable. Where pus is present operation is, of course, imperative—where the presence of pus is doubtful we should be guided by the amount and position of the swelling. If a whole segment or more of the finger is swollen and hard operation is definitely indicated whether pus be present or absent—the chief aim of the incision being to relieve the tension and prevent or relieve strangulation. If the segment is not completely involved in the swelling it is permissible to wait, but if pain and swelling persist in spite of complete rest of the hand then operation should be undertaken.

The preparation for and details of the operation are, I think, of the utmost importance. In practically every case a general anaesthetic should be administered. Only a minority of doctors and patients have the resolution to perform and sustain an adequate incision through the acutely tender tissues of an inflamed finger. Freezing with ethyl chloride is in most cases no anaesthetic at all; infiltration with novocain is almost always unsuccessful in inflamed tissues and has the additional disadvantage of increasing the tension in the tissues and so adding to the danger of the strangulation.

A bloodless field is an enormous advantage in saving time and mess and in enabling the operator to see exactly what are the conditions present. It is readily and safely obtained by the use of a tourniquet above the elbow. With a tourniquet the operation field is changed from a welter of blood in which by continual sponging one gets an occasional glimpse of the tissues to one of comfort and precision. The full advantages are not obtained, however, unless the wound is firmly bandaged before the tourniquet is released. If this is done it is unnecessary to spend time picking up and ligaturing vessels.

The incision should be along the middle of the palmar surface. Its length will be determined by the conditions present. If the terminal segment alone is involved in the swelling it should extend into the next segment so as to divide the palmar crease completely. If two segments are involved the incision should extend into the third, and if the whole finger is swollen the knife should be carried into the palm. If the palm is also tight and hard it should also be split to above the distal crease of the wrist. The object in every case is to divide whatever may be acting as a band of constriction.

There is no need to be frightened of long incisions either in the fingers or the hand; provided the underlying tissues have not sloughed the skin will eventually heal with an almost linear non-disabling scar. It is only by free incision that it is possible to relieve the tension and so arrest the spread of the infection.

In the finger the incision should be carried down to but not into the tendon sheath or periosteum unless they are already involved. In the palm the incision should divide the deep fascia.

When the tendon sheath is found to be infected it should be at once laid open—in the case of the middle three fingers to its termination in the palm; in the case of a little finger the sheath should be opened as far as the common sheath in every case. If there is not pus at the junction no more should be done for the moment—if pus is present in the common sheath it should be laid open as far as the anterior annular ligament. If the pus extends under this, the ligament should be divided and the sheath opened right up into the forearm. Where the incision crosses a nerve this should be identified—usually a simple matter when a tourniquet is used—and preserved as a bridge across the incision.

As soon as the exact condition of affairs has been determined the wound should be washed with saline and packed with dry gauze and firmly bandaged and immobilized on a splint. The tourniquet may then be released and the patient put back to bed with the hand elevated. Morphine should be freely given to relieve pain during the next twenty-four hours.

As regards after-treatment the tight bandage put on to prevent bleeding should be cut through within twenty-four hours, as otherwise it may exert undue pressure, and may give rise to much pain. The dressing itself should not be disturbed for forty-eight hours, and then only the outer gauze. The packing is best left undisturbed for seventy-two hours, when saline or eusol or peroxide baths may be instituted.

To recapitulate:

1. Infections of the hand are remarkable for the serious results which so often follow superficial and trivial injuries.
2. These complications are the result of a process of strangulation arising from the peculiar anatomical features of the hand and fingers.
3. Treatment should be primarily directed to relief of strangulation.
4. It is best carried out by free incision in a bloodless operation field.

V.—R. M. HANDFIELD-JONES, M.S., F.R.C.S.,

Assistant Director, Surgical Unit, St. Mary's Hospital.

I PROPOSE this morning to confine myself entirely to the infection of various fascial spaces in the hand, which occur as complications in the course of infections of the fingers. I would first like to congratulate this Section on having chosen a subject—so often relegated to the realms of minor surgery—which has such a wide appeal to every class of medical practitioner, owing to the supreme importance of the hand in the wage-earning capacity of our people, and because, on the whole, the disasters which follow whitlows are more appalling than almost any major surgical procedure. Secondly, it is my great pleasure to express the indebtedness which surgeons the world over owe to Professor Allan B. Kanavel for his masterly exposition of the pathology, symptomatology, and treatment of the infections of the hand.

The spaces I would bring to your notice are (*a*) the middle palmar space, (*b*) the thenar space, and (*c*) the distal forearm space, if time permits; and perhaps I may be allowed

quite rapidly to define for you the limits of these fascial spaces, because they are not adequately dealt with in text-books of surgery and anatomy.

The Middle Palmar Space.

This, the most important space in the palm, has the following boundaries: Posteriorly, the fibrous sheet overlying the interosseous muscles. Anteriorly, a fibrous sheet which separates it from the tendons of the ring and little fingers and their accompanying lumbricals and the extension of the ulnar bursa. Radially, a fibrous sheet separating it from the thenar space, being attached to the palmar fascia in front, and the fascia over the adductor transversus behind. On the ulnar side, it extends as far as the radial index of the fifth metacarpal; distally, it reaches the level of the inward flexion crease of the palm; proximally, it sends a small isthmus up beyond the wrist-joint into the forearm. In addition, distally, it has three diverticula corresponding to the three lumbrical canals.

The Thenar Space.

This has the following boundaries: Posteriorly, fascia covering the adductor transversus. Anteriorly, palmar fascia and the thenar muscles and the tendons of index finger and of the flexor longus pollicis. Radially, reaching nearly to thumb metacarpal. Ulnar side, a fibrous septum separating it from the middle palmar space. Distally, as far as the radial end of middle flexor crease. Proximally, as far as the carpo-metacarpal articulation of index.

Relations of Spaces to Tendons and Each Other.

It will be seen that the tendon of the little and ring fingers and their lumbrical muscles are in close contact with the middle palmar space; and those of the index finger and thumb similarly with the thenar space. The tendons of the middle finger occupy an intermediate position, but tend to have a more intimate relation with the middle palmar space than with the thenar. It will be noticed also that the two spaces are separated by a fascial sheet which is very dense in its whole length, except at the proximal part, where it is so thin that pus in one space can easily invade the other.

Methods of the Infection of the Spaces.

Middle Palmar Space.	*Thenar Space.*
1. From little finger tendon sheath (if not in continuity with ulnar bursa)	Index tendon sheath
2. From ring finger tendon sheath ...	From longus pollicis sheath
3. From middle finger tendon sheath	Middle tendon sheath
4. From lumbrical canals of little ring and middle fingers	Index lumbrical canal
5. Rupture of ulnar bursa	Rupture of radial bursa
6. Direct puncture wounds	Direct puncture wounds
7. Lymphatic spread	Lymphatic spread
8. From thenar space	From middle palmar space

A realization of these avenues of infection gives great assistance in the difficult task of diagnosis.

Diagnosis.

The diagnosis is obviously of very great importance, for if left untreated the infection will spread in almost every direction, except to the surface, with the most disastrous results to the eventual function of the hand. General symptoms are those common to all severe infections—fever up to 104°, restlessness, hectic flush of the cheeks, and in short a typical picture of toxic absorption. Next the source of the infection must be considered, and, as I have already shown, the site of the primary focus points to very definite probabilities in the infection of the spaces.

Locally we have the following symptoms and signs:

1. Pain limited to the area of the space involved. This is not so accurately limited as in acute teno-synovitis and in a day or two is apt to become less marked, owing to pressure of oedema on nerves.

2. Marked tenderness over area concerned.

3. Swelling (its location and degree) is the most helpful sign we have. In the thenar area, where there is no dense fascia the thenar eminence becomes ballooned in no mistakable fashion. In the middle palmar space the dense fascia prevents anything like the same aspect of distension, but it is enough to obliterate the normal concavity of the palm and, even more, to cause a slight convexity.

Swelling on the dorsum of the hand I wish to lay particular stress upon. Every infection in the palm causes swelling on the dorsum. The inflammatory process early reaches the webs of the fingers by way of the lumbrical canals, and thence spreads rapidly through the loose areolar tissues of the dorsum. Except in direct infections of the back of the hand, primary dorsal abscesses are extremely rare. This point needs special emphasis, because in many hands the dorsal swelling to the untrained eye appears to be the most prominent feature of the case. This is promptly incised, not once but several times, without the least improvement in the hand, and the real abscess remains undrained. In 99 per cent. of cases no incision should be made on the dorsum at all, unless it be to open the thenar space.

4. Position and movement of the fingers do not help much, save that the fingers tend to be semiflexed. They can, however, be moved without much pain and this serves to remove any suspicion there may be of acute teno-synovitis.

Treatment.

The spaces must be opened and drained. The middle palmar space is drained by an incision along one of the three lumbrical canals leading into the space—namely, those of the little, ring, and middle fingers. Usually one will choose that canal which is most obviously infected, either because it was the route by which the space became affected, or shows signs of having become the worst affected. If none of the three call for attack, the best approach is through the little finger lumbrical canal. The incision is shown on the slides; that on the ulnar side opens the space only, the other the space and lumbrical canal. The dotted lines show how these incisions may be combined with those opening the ulnar bursa and those opening the tendon sheaths of the fingers. The incision should not extend higher than the middle flexion crease. The tendons are exposed and under them, following the lumbrical muscle, is thrust a pair of artery forceps. The space thus being opened, a rubber tissue drain is inserted and general treatment instituted.

The Thenar Space.—An incision is made on the dorsum on the radial side of the index metacarpal, corresponding in length to the shaft of that bone. The lower margin of the adductor transversus pollicis is identified, and around this a pair of artery forceps is directed on to the palmar aspect of the muscle. They must not be pushed in beyond the middle metacarpal bone for fear of infecting the middle palmar space. The thenar space is then opened and is drained in the usual way.

VI.—J. E. H. ROBERTS, O.B.E., F.R.C.S.,

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THE subject is so large that I shall confine my remarks to some points in sepsis of the fingers. First with regard to infection in the pulp of the finger. Charles Dorrance of Philadelphia has shown in an admirable paper that there is a closed fibrous tissue space in front of the terminal phalanx and that the arteries to the phalanx, with the exception of branches to its base, run through this space. Sebaceous and sweat glands run down into this space, and it is by the ducts of these glands that infection may gain entrance. In my experience direct infection by pricks, etc., does not occur in a considerable proportion of cases. The usual history is that at first a pricking feeling is noticed, and when the finger is examined the pulp looks a little more prominent, and feels hot; later it begins to throb. At this stage the veins are compressed within this fibrous sac but the arteries are still patent. At the end of twenty-four to forty-eight hours all throbbing ceases because the tension is now high enough to close the arteries, necrosis of the phalanx is now certain though the base of the phalanx escapes because its blood supply comes from outside the sac.

All cases should have general anaesthesia—gas is sufficient—and a tourniquet. An incision passing close to the end of the nail and continued down the sides of the fingers to within a short distance of the lower end of the phalanx provides perfect drainage by raising an anterior flap and avoids damage to the nerve plexus in the pulp of the

finger. If done early, before pus forms, it is usually healed in three days. If incision is delayed for forty-eight hours the majority of cases take six weeks to heal.

The dressing I prefer is one of paraffin and flavine. I have a strong objection to fomentations for longer than forty-eight hours, in nearly all these septic hands. If the case is not seen till later, I do not remove the necrosed phalanx at once as so often it recovers with the loss of a superficial sequestrum only. In cases of streptococcal lymphangitis, of which I have twice had personal experience, I agree that no incision should be made at first. Here the application of moist heat relieves pain and aids the defence of the body. Hot continuous baths are of great value, and in cases where the whole arm is swollen I can from personal experience recommend the old-fashioned linseed poultice applied from the shoulder to the wrist. A linseed poultice keeps hot for two hours and is most comforting. On the actual lesion on the finger or hand a boric fomentation may be applied.

I agree with Mr. Max Page in recommending the flexed position of the hand in affections of the palmar surface, but where the dorsal tendons are involved, as they sometimes are, the extended position is best. In infections of the tendon sheaths I wish to protest against the long median incision which leads to prolapse of the tendon and a stiff finger. Lateral incisions not passing over the joints give adequate drainage, and are less often followed by permanent stiffness. Early attention to movements and the restoration of function in the hand is essential. I notice that the title of the paper refers to complications. Consideration of these would lead us on to the whole of the surgery of sepsis. I have recently had cases of septic arthritis of the hip-joint, of multiple arthritis, and of empyema, all following neglected septic fingers. I saw also a case, a couple of years ago, of sarcoma in the unhealed wound of a septic thumb.

DISCUSSION.

Sir HENRY M. W. GRAY (Aberdeen) recalled the success which they had during the war with the treatment of septic joints in accordance with suggestions made by Willems, where early movement was a feature. In his experience of infections of the hand under discussion the presence of pus in quantity was rather a good thing than otherwise. The principles of the treatment were free incisions with free exit of pus and encouragement of early movement.

Mr. HAROLD BURROWS (Portsmouth) remarked on the grave sequelae after the infections of the hand set up by septic phlebitis. After the period of fomentation dressings was over he recommended the use of liquid paraffin and flavine.

Mr. MAMOURIAN (Ashton-under-Lyne) said that the work of Bier, Kanavel, and others had made them all familiar with the pathological aspects of the infections of the hand. Excepting minor individual divergencies, they were all agreed on the broad lines of treatment which Mr. Wilkie had so lucidly explained. Little allusion had been made to the steps necessary to secure functional restoration of the hand and in certain cases to preserve the beauty of the hand. Mr. Max Page had rightly stressed the importance of the semiflexed position of the fingers during treatment, and Mr. Roberts did well to draw attention to the danger of long mesial incisions on the fingers. The incisions should be small and lateral so as to avoid prolapse and sloughing of the tendons. In cases of suppuration of the bed of the nail, mention should be made of the advantage of making two incisions in line with the edges of the nail—the lunule could then be turned up as a flap. The new nail grew without any unsightly ridges or grooves. In cases of neurosis of the terminal phalanx the base, with the insertion of the long flexor, generally escaped. After the removal of the small sequestrum the tissues collapsed and a bullet-headed finger resulted. The insertion of an ivory peg supporting the soft structures by through-and-through sutures and left *in situ* until it got ensheathed by new bone would be found to help materially in lessening deformity. In certain cases extension of the finger would be found advantageous. In workmen the thick edge of the nail could be perforated and a light weight suspended thereby; in other cases—fractured phalanx with infection—a small steel pin through the finger tip would be found to give excellent anchorage for weight or spring extension. In some cases of necrosis of both phalanges of the thumb he had used a lining bone graft by way of internal splinting and had secured good functional results.

Mr. FIRMIN CUTHBERT (Gloucester) pointed out the danger of introducing sepsis from superficial wounds to the deeper parts of the hand, and urged that incisions should be made with the greatest possible care. Every surgeon should exercise precautions in regard to his own fingers. It was so easy to adopt prophylactic measures, and nothing should be neglected to prevent the possibility of sepsis.

Mr. R. CAMPBELL BEGG (New Zealand) said that he had had experience in a group of Transvaal mines where 6,000 boys were employed, and he found that 20,000 days' work a year was lost through septic infection of fingers. This was practically eliminated by a pot of iodine and a paint brush at the shaft head. The boys had painted any abrasion with iodine. Most useful treatment was summarized in gas and oxygen anaesthesia, tourniquet and large incisions and, in bad cases, Carrel-Dakin treatment.

DIVISION OF THE VAS DEFERENS IN PROSTATECTOMY.

BY

A. CLIFFORD MORSON, O.B.E., F.R.C.S.,

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A STUDY of the anatomy of the prostate gland and of the structures adjacent to it will convince the surgeon that the removal of this organ by operation must always result in laceration of the ejaculatory ducts and sometimes damage to the vesiculae seminales. After prostatectomy the raw surface between the base of the bladder and the triangular ligament becomes gradually covered with mucous membrane, which, in about a fortnight, has grown downwards and forwards in such a manner that the new internal meatus is situated at the vesical end of the membranous urethra, so that the seminal vesicles are completely sealed off from the urethra and bladder. Therefore, should bacilluria or cystitis be present at the time of operation infection will spread to these accessory organs of generation, and become shut off from the bladder cavity. Once bacteria have invaded the seminal vesicles their destruction is slow on account of inaccessibility to antiseptics and other local treatment.

It is an unfortunate fact that a very common complication of this operation is vesiculitis. The signs and symptoms are quite definite:

(*a*) First, during the first ten days following removal of the gland the temperature oscillates between 100° and 97°, and when micturition recommences there is a slight increase of the fever, erroneously ascribed to a reaction due to the return of the normal function of evacuation of urine. Rather is the rise of temperature owing to the muscular contraction required to expel the urine from the bladder into the urethra, which increases the inflammation of the seminal vesicles, and sets free in the blood stream a fresh dose of toxin.

(*b*) Secondly, irrigation of the urethra by Janet's method, instead of being a painless process, is attended by considerable discomfort.

(*c*) Thirdly, at the commencement of the act of micturition and throughout the passage of urine along the urethra the patient complains of pain (usually not severe) referred to the neck of the bladder.

(*d*) Lastly, rectal examination reveals tenderness on pressure in the region of the base of the bladder.

As it is the exception rather than the rule for the surgeon to make a rectal examination before the patient passes out

of his care, cases of post-prostatectomy vesiculitis are frequently overlooked. Once this condition is established it is but a matter of time before the inflammation spreads to the testicle.

This further complication usually occurs within a few weeks of the onset of vesiculitis, but as long an interval as three months may elapse. It is a common experience that the patient will return with an attack of orchitis although his immediate convalescence appeared to be satisfactory. Local treatment of the testicle, such as fomentations, mercurial inunction, and diathermy, will cause the attack to subside, but no guarantee against a further recrudescence of the inflammation can be given so long as a nidus of infection persists in the seminal vesicle.

In a recent article in the *Lancet* Winsbury White has drawn attention to the frequency of epididymitis as a complication of prostatectomy. Studying 50 cases from the records of St. Peter's Hospital he found that 82 per cent. gave evidence of inflammation of the testicle, and tabulated the degrees as follows:

1. Thickening of the epididymis.
2. This change is more marked. The epididymis becomes adherent to the testis and its coils adherent to one another.
3. The epididymis becomes large, hard, and firmly fixed to the testis. The change as a rule is more marked in the globus minor. There may be some tenderness.
4. The tunica vaginalis is distended with fluid. The epididymis is large, fixed, and tender; pain is marked, tenderness is acute, the scrotum becomes red and sometimes oedematous.
5. The previous condition goes on to pus formation in the epididymis. It involves the testis, which sloughs.

These observations make it clear that the patient's general state of health can remain seriously impaired, although he has submitted himself to prostatectomy.

Since Freyer popularized the operation of suprapubic prostatectomy it has been the aim of surgeons to improve upon the original technique in order to minimize the risk of complications, but only slight success has rewarded their efforts. The explanation lies in a recognition of the difficulty of preventing the kidneys, damaged by back pressure, from excreting a urine loaded with colon bacilli. Since prevention is better than cure, we can endeavour to avoid vesiculitis and orchitis by urging our patients to submit themselves to prostatectomy before bacilluria has occurred. But should bacilluria be present the attempt must be made by the methods outlined by me in a recent article in the *Journal of Clinical Research* to cleanse the urinary conduit before the operation of removal of the gland is undertaken. However, this is not always possible, and so the surgeon must introduce some technique at the time of operation to limit the spread of infection from the bladder to the seminal vesicles, and thence to the testicles.

It has been suggested that following the enucleation of the gland, the vesiculae seminales might be removed by dissection, but personally I am of opinion that such further prolongation of the operation as this would entail (and also taking into consideration the poor state of health and possibly advanced age of the patient), would cause the mortality rate of suprapubic prostatectomy to rise immediately.

The infection of the seminal vesicles can be prevented by ligation of the ejaculatory ducts, and in certain selected cases I have adopted this procedure; but the difficulty of ligating these small ducts, when the tissues around the base of the bladder are constantly bathed in blood, will produce the same result as may be expected from removal of the seminal vesicles by dissection.

As the isolation of the seminal vesicles from infection is so problematical we must consider what steps can be taken to prevent it spreading to the testicles. I have found that by dividing the vas deferens below the external abdominal ring I can guarantee to my patients that whatever other complications they may get they will never suffer from epididymo-orchitis.

The technique is simple, and in less than five minutes both vasa can be isolated and divided. After having removed the prostate and closed the wound of the anterior abdominal wall I feel for the vas among the other constituents of the spermatic cord through the skin of the upper part of the scrotum. I then hold it firmly between my finger and thumb immediately beneath the skin. Having next made a small incision a quarter of an inch long, the vas deferens can be picked up with a pair of toothed forceps and pulled out of the wound. The loop of duct thus exposed is freed from the loose cellular tissue which surrounds it and divided between two catgut ligatures. It is not necessary to remove a piece of the vas deferens, interference with its continuity being sufficient for the purpose. The two ligated ends are pushed back into the wound, which is closed by a single suture of catgut. To save time, while I am dividing the vas on one side my assistant is doing the same on the other.

Not so long ago it was taught that when the vas deferens is cut atrophy of the testicle will follow. This is an entirely erroneous observation. I have carried out the technique just described on every case of prostatectomy, both in hospital and private practice, for the past two years, and not in a single case has the testicle wasted. Moreover, there is no loss of sexual appetite and no inhibition of the act. Nor have I experienced any failure to prevent orchitis. The result of this small operation proves that infection from the region of the prostate spreads to the testicle along the vas, and not by way of the blood stream. It also demonstrates that the lymphatics concerned as carriers of infection must be in the wall of the duct, since in a few cases I have had to open an abscess under local anaesthesia at the point where I had divided the vas, the infection having spread along the duct, where its further progress was blocked by the dissolution of continuity at the external abdominal ring.

SECTION OF PATHOLOGY AND BACTERIOLOGY.

HUGH MACLEAN, M.D., D.Sc., M.R.C.P., President.

DISCUSSION ON THE VALUE OF SEROLOGICAL TESTS IN DIAGNOSIS.

OPENING PAPER

BY

H. R. DEAN, M.A., M.D.Oxon., F.R.C.P.,
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THE serum reactions—by which we understand, as I think, the reactions which take place *in vitro* between antigen and antibody and which are used for diagnostic purposes—are in a sense by-products. They owe their origin in the first place to the work of men whose primary object was the study of the means by which bacterial disease may be prevented or cured. It was in the endeavour to explain the mechanism by which resistance to bacterial disease can be developed by inoculation that the phenomena were observed which led the bacteriologists of the world to explore the possibilities, unsuspected at first, of serum diagnosis. The agglutination reaction was discovered in 1886, precipitation two years later, and in 1902 Bordet and Gengou published the results of experiments on the action of complement, which were destined to be used after a lapse of years and by others for purposes of diagnosis. The early and the all-important discoveries in this field were made by men who were interested in the broad and general principles of immunity, and the valuable practical methods which were the outcome were not the primary objects of their discoverers.

On the other hand, during the last fifteen years the usefulness of serum reactions as practical aids to diagnosis has received full recognition. The discovery of new methods of diagnosis and the application of already known methods to other forms of infective disease has become with steadily increasing frequency the primary object and the ultimate goal of research. Investigations in the field of serum diagnosis have multiplied and the literature of the subject has become voluminous. Interest in the by-product has increased and efforts to solve the fundamental problems of immunity have been of recent years relatively infrequent. On the action of toxin, on the nature of the union between toxin and antitoxin, on the great problem of specificity, on the bactericidal action of antiserums we have little informa-

tion, and of recent years little has been added to our knowledge.

Nor does it appear that the intensive study of practical methods of diagnosis which has prevailed during the last fifteen years has yielded results of very vast importance. Progress there has been: improvements of method and improvements in details have led to greater accuracy and to some extension of previously known methods to diseases for the diagnosis of which serum methods had hitherto not been employed. The old methods still stand out—the agglutination or Widal reaction for the recognition of infections produced by the typhoid bacillus and its near relatives, and the complement fixation reaction for the diagnosis of syphilis. These two reactions, the Widal and the Wassermann reactions, stand out in a position of regrettable isolation, for, in spite of much work, efforts to extend the agglutination and complement fixation reactions to the diagnosis of other important infective diseases do not appear to have been crowned with success commensurate with the amount of work which has been done.

The Significance of Specificity in the Serum Reactions.

The remarkable specificity which obtains in the reactions which take place between antigen and antibody was observed during the progress of the earliest work on the serum reactions. Almost every year has added something to our knowledge of the exquisite differentiation between closely related substances which these reactions can enable us to effect. The specific affinity of antigen for antibody and the nature of the specific, and, I suppose, chemical, reaction which underlies and is the cause of the demonstrable phenomena which we call serum reactions, remains to-day as great a mystery as ever. To review the problems arising from this specificity of antibodies is to review the whole subject of immunity, and I must select one particular aspect of specificity for consideration to-day. What does the specificity of the serum reactions signify? What is the meaning of a difference demonstrable by a serum reaction between two cultures of bacteria which when compared by any other method appear to be both morphologically and culturally identical? Does a serological difference between two cultures, unsupported by any difference demonstrable by any other means, justify us in the conclusion that we have to do with two separate species? Or are we to consider an unsupported serological difference as evidence of variation or mutation within one species? Are serological differences of more significance than morphological differences or such physiological or cultural difference as can be elicited by the examination of the capacity of a particular micro-organism to ferment a series of test sugars?

Our study of this aspect of specificity may well begin with the publication of Nuttall's classical work in 1904. Nuttall showed that the blood serum of nearly allied species of animals can be differentiated by the precipitation reaction. He was able also to demonstrate by serological methods the degree of relationship which obtained between various species of nearly allied animals. The usual methods of classification used by zoologists were confirmed and amplified by his results. A similar sharp differentiation of species as well as a general group relationship was worked out for the typhoid-paratyphoid group of bacteria chiefly by the agglutination method. This group of bacteria, the members of which show to one another a great variety of degrees of intimacy of relationship and at the same time possess a happy capacity for producing high titre serum in inoculated animals, has provided the serologist with a peculiarly happy playground and opportunity to exercise all the manipulative finesse which increased technical skill has rendered possible. Agglutination, after preliminary absorption, or complement fixation shows differences between *B. paratyphosus* B and *B. aertrycke*, two nearly allied members of this group whose morphological and cultural characteristics are identical. The value of this delicate differentiation is in this case proved by the great differences between the types of illness produced by these two varieties of bacillus. The separation of pneumococci and meningococci into groups has opened up a new chapter of serum therapeutics and the serum differentiation has been confirmed by observed differences in cultural characteristics and in virulence.

A new light on the specificity of the serum reactions has been cast by the work recently published by Andrewes. It is well known that if a rabbit is immunized by injections of a culture of some member of the Salmonella group, *B. aertrycke*, for example, the resulting serum may agglutinate not only the homologous bacillus but also its near relatives. Such a serum is said to contain a mixture of specific and group agglutinins. Andrewes took a pure culture of *B. paratyphosus* C and plated it out. Subcultures were made in broth from ten separate colonies. These ten subcultures were tested with a specific paratyphoid C serum (a serum from which group agglutinins had been removed) and against a serum rich in group agglutinins (which had been prepared by injecting an animal with a culture of a nearly allied member of the Salmonella group). Five of the subcultures were agglutinated practically to full titre by the specific paratyphoid serum and failed to agglutinate with the group serum. The other five cultures were slightly affected by the pure serum but agglutinated by the alien group serum to about one-third of the full titre for the homologous strain. That is to say, the colonies on the plate were of two different kinds and apparently of two different kinds only. As each must be considered as the product of a single bacillus it follows that a pure culture of a micro-organism contains individuals of different kinds, and these differences can be demonstrated by a serum reaction. Andrewes attempted to cultivate the two types as separate entities. At times he succeeded in obtaining two successive broth cultures in which the character was maintained pure, but far more commonly even the second broth culture showed a mixture of types.

It is evident, therefore, that serum reactions can be made to demonstrate variations occurring in the individuals comprising the population of a pure culture. It is evident that the differentiation which can be effected by a serum reaction goes a great deal further than the differentiation of one species from another. It is, of course, very difficult to define what we mean when we use the word species in relation to the bacteria. There are many named and described varieties within the Salmonella group. These can be differentiated with varying degrees of difficulty by their behaviour on sugar media and by the type of disease which they produce as well as by their serum reactions. It seems difficult to say what degree of difference or what combination of differences would justify us in speaking of a distinct species. On the other hand, bacteria apparently so distinct from one another as the meningococcus and the gonococcus appear to have a great similarity in antigenic structure. Indeed, experienced workers have expressed their inability to distinguish by serological methods the gonococcus from the meningococcus. If micro-organisms which we should all regard as belonging to different species may contain antigens which have so much in common with one another and if the individual bacilli in pure culture of a strain of *B. aertrycke* are liable to such profound spontaneous variation in their antigenic structure, it seems obvious that we yet have much to learn as to the significance of the sharp differentiation which we are able to effect by means of serological methods.

Another example of the ultra-specific analysis, which serological methods allow us to carry out, is provided by the iso-agglutinins for blood corpuscles, by the help of which we may divide mankind up into four groups. Here, again, is a matter of great biological interest. By serological methods we are able to distinguish very subtle differences between individuals. Moreover, it seems that the transmission of these characteristics from parent to offspring can be shown to follow the accepted principles of heredity.

An extreme example of specificity was brought to my notice during the later years of the war when the majority of wounded men received four and often more prophylactic doses of tetanus antitoxin, and it was to be expected that in a few cases symptoms of anaphylaxis might occur. Cases in which serious symptoms occurred were very few, but it sometimes happened that in one hospital and during one week several mild cases were reported. Thinking that such cases might be due to some peculiarity of the particular brand of antiserum, R. S. Adamson and I obtained specimens of serum from these patients. We used the patient's serum as an antihorse serum and used as antigens various

samples of antitoxin and specimens of normal horse serum obtained from the slaughterhouse. From one patient who had shown marked signs of shock we obtained a serum which reacted with dilutions of the antitoxin which had been used to inoculate him and formed with this antitoxin a well marked precipitate. The same patient's serum when mixed with similar dilutions of a normal horse serum produced only a faint trace of precipitate. We then performed the converse experiment and tested an antihorse serum which we had obtained from a rabbit after injections of horse serum, against dilutions of normal horse and against dilutions of antitoxin. In this case marked precipitates were found in the tubes containing the normal horse serum and only traces in the tubes containing antitoxin.

Subsequently we immunized a series of rabbits with different specimens of horse serum obtained from individual horses and also with specimens of antitoxin obtained from various firms and laboratories. The antitoxic serums were, of course, usually mixtures derived from several horses. By complement fixation methods it was possible to show well marked differences between individual horses and between various brands of antitoxin. Our material was, of course, insufficient for any attempt at grouping the various serums according to their antigenic value. It seems possible that by a sufficiently extended series of experiments a definite grouping of horses might be effected. Members of each group might be utilized for antitoxin production and by the use of a series of antitoxic serums derived from horses whose serum showed well marked serological differences, the dangers attendant on repeated inoculations of antitoxin might be reduced.

Another example of extreme specificity is provided by the antibody formation which follows the injection of extracts or emulsions of particular organs. There is some evidence that a specific antibody can be produced by the injection of the proteins or antigens of the lens of the eye. It is evident that here we have to deal with the differentiation of single organs within one individual.

Dale's experiments on anaphylaxis afford another example of extreme specificity. By the use of the guinea-pig uterus method Dale has shown antigenic differences between the protein fractions of one and the same sample of serum. If, as some maintain, the differences between the various fractions into which serum proteins may be separated depend largely on physical differences, differences in the state of molecular aggregation, rather than on differences of chemical composition, it is evident that the interpretation of the significance of the specificity of the serum reactions may lead us in new and unexpected directions.

The Significance of a Positive Reaction.

It seems to me that it is worth while to pause and consider what a positive serum reaction means. In typhoid and allied infections the significance of a positive reaction is purely diagnostic. It tells us that the patient has typhoid or that he has had typhoid fever or that he has had an inoculation of typhoid vaccine. In the case of the Wassermann reaction, if you will admit that a positive Wassermann reaction depends on the presence of an antibody, there is, in addition to the diagnostic, a therapeutic and prognostic interest. In a case of declared syphilis we are pleased if by treatment we can convert a positive into a negative reaction. If, later on, the positive reaction returns we may predict a return of symptoms of active disease. On the other hand, there are many cases of syphilis in which the disease has been latent for twenty years, in which a strongly positive reaction may be present in the serum of a man who appears to be in perfect health. It is related that women who have borne syphilitic children may never show any sign of active disease and yet when examined years after the presumed date of infection may be found to have a strongly positive Wassermann reaction.

The complement fixation reaction in cases of gonorrhoea, the reliability of which as a practical test has in my opinion still to be established, has been put to a significant use. In long-standing cases of this disease, it is notoriously difficult to determine the period during which the patient must be regarded as infective. It has been suggested that a patient should be considered infective as long as the reaction remains positive. The serum diagnosis of tuberculosis presents peculiar difficulties. On the one hand it is generally believed that a large proportion of human beings incur at one time or another a tuberculous infection, on the other hand there are reasons for thinking that antibodies are not always or very readily formed as a sequel to infection by the tubercle bacillus. At any rate, it has been held that tuberculosis may be diagnosed by the recognition of antibody deficiency in the blood of the patient. A low opsonic index was very generally considered, at one time at any rate, of great importance in the diagnosis of tuberculous disease. The opsonic index method is peculiar among serum reactions in that it readily allows the expression of the antibody content in below normal or negative values. The direct consequence of these observations, which showed that the blood of a tuberculous patient might show a low opsonic index, was an increased interest in the therapeutic use of tuberculin with the object of increasing the antibody content of the patient's blood. The possibilities of the complement fixation reaction for the diagnosis of tuberculosis have been in the minds of almost all serum workers since the time when Neisser and Sachs first turned this reaction to diagnostic use. In the early days of serum work the importance which would attach to such a test was clearly recognized, and subsequently, when the practical value of the Wassermann reaction had become established, a considerable stimulus was given to the efforts of those who aimed at a complement fixation reaction for tuberculosis.

The outcome of much work, of much more work than has come to publication, has been disappointing. It has been very generally assumed that one of the main difficulties lay in the preparation of a suitable suspension or extract of bacillary substances. But this technical difficulty of the bacillary extract may not be the only or even the chief difficulty. In the palmy days of the opsonic index it was claimed, and I presume the claim was well grounded, that many, perhaps a majority of, tuberculous patients could be shown by the opsonic index method to be deficient in antibodies. The serum of such patients had, in fact, less opsonin than the serum of a healthy man. At the present time the complement fixation reaction is more popular, or at any rate is regarded as affording better prospects of success. But it would be surprising, I am disposed to think, if it was found that patients who could be diagnosed as tuberculous because their opsonic index was low could also be diagnosed as tuberculous because their serum gave a positive complement fixation reaction. In this connexion and at this moment I am not inviting you to believe, as I do believe, that both phagocytosis and complement fixation are controlled by a reaction taking place between antigen and one and the same kind of antibody. Even if you are convinced that specific opsonin is quite a different kind of antibody from the complement fixing antibody, it must still seem remarkable that tuberculosis can be recognized by deficiency of the one and by superabundance of the other. Judged by the one reaction tuberculosis is to be suspected if the antibody content of the serum is below normal, judged by the other if the antibody content is above normal.

From the above it would appear that our interpretation of the significance of a positive reaction is somewhat empirical and founded largely on the practical experience of different workers, using different reactions for the diagnosis of different diseases. The value of all this practical experience I do not for one moment question, but I think that we might have a better understanding of these varied phenomena if we had more information as to the relation between the production of antibody and the persistence in the body of the alien protein or antigen. It seems to me that the facts within our knowledge can be covered by an hypothesis which I venture to put forward for your consideration. The formation of specific antibody is induced by the introduction of the antigen into the animal body, is continued as long as the antigen persists in the tissues, and comes to an end when all traces of the antigen are destroyed. According to this hypothesis the presence of antibody in a patient's serum, a positive serum reaction,

would be evidence of the existence at that time of antigen in his tissues.

Convincing proof of the truth of the hypothesis here put forward is, of course, lacking, but it appears to me that it is not inconsistent with the established facts of the serum reactions, and, moreover, it is possible to put forward some small amount of evidence in support. If we wish to study the relations between the persistence of antigens and the production of antibodies we shall do well to avoid the use, as antigens, of living bacteria which may multiply in the body subsequent to injection. For our purposes an alien serum or a suspension of dead bacteria, of which the size of dose may be estimated, is more suitable. If horse serum is injected into the ear vein of a rabbit, the gradual disappearance of such an antigen may be observed by taking daily samples of the rabbit's blood, which are tested for horse serum by the precipitation or more conveniently by the complement fixation reaction. If the daily sample is tested for the presence of both antigen and antibody we can obtain daily records of the presence of both in the blood of the animal. Experiments of this type have been carried out by Uhlenhuth and others. In the course of such an experiment antibody may be first demonstrable on about the fifth day after the injection. Subsequently, and for as long a period as the presence of the antigen can be demonstrated, it is found that antigen and antibody coexist in the blood. Uhlenhuth was able to demonstrate the persistence of free antigen for fifteen days after its injection. During the war I had the opportunity of carrying out similar tests on soldiers to whom I had given large intravenous doses of tetanus antitoxin. In severe cases of tetanus I have often injected as much as 120 c.cm. of serum into a vein. From some of these cases I collected weekly samples of blood and tested the resulting serum for free horse serum. In one case horse serum was still present on the forty-fourth day after the injection and in several other cases it had not disappeared after three or four weeks.

The persistence of free antigen for these long periods seems to me a matter of some importance, and it seems reasonable to suppose that traces of antigen may persist for much longer periods than it is possible to prove by the methods at our disposal. The coexistence of antigen and antibody in the same specimen of blood is, of course, well known and can be readily demonstrated. Moreover, if daily samples be taken from a rabbit after an injection of horse serum it will be observed not infrequently that on or about the eighth day the serum, which may be quite clear when first separated from the clot, throws down on standing a spontaneous precipitate produced by the interaction of the free antigen and antibody which it contains. The formation of this spontaneous precipitate may be hastened by diluting the serum with saline solution. The effect of dilution and the fact that in the undiluted serum the precipitate forms but slowly suggest that under the conditions which prevail in the circulating blood the interaction of antigen and antibody within the blood vessels is usually in some fashion prevented. In a fatal case of anaphylactic shock following a fourth prophylactic injection of tetanus antitoxin, which I investigated some years ago, the specimen of serum obtained from the heart blood did show a spontaneous precipitate on standing. This precipitate formed in the separated serum and it formed some twenty-four hours after the patient's death. Death was not due to the formation of a precipitate during life in the patient's blood, but it is of interest to note that he died of anaphylactic shock at the time when antigen and antibody were present in his blood in such relative proportions that a precipitate formed in the separated serum.

It seems quite possible that the rash and other symptoms of serum sickness, which may follow the use of antitoxin, may occur at the moment when the relative proportions of antigen and antibody are so adjusted that a reaction between them is possible. Within the blood vessels of the living body this reaction between the optimal proportions of antigen and antibody does not in all probability proceed to the formation of a precipitate, but a much less pronounced aggregation of the molecules of the blood proteins might be enough to produce very definite symptoms. In several of the cases which I have mentioned, and in which I obtained regular samples of blood after a big injection of antitoxin, urticaria and serum sickness occurred, usually about the fifth day after the injection. My results showed that free horse serum (antigen) was present in the blood of these men, both before and after the attack of serum sickness. In one or two cases it seemed as if the attack of serum sickness was followed by a sharp fall in the amount of free antigen in the patient's blood. At any rate free antigen could be demonstrated for weeks after the attack of serum sickness and presumably continued to act within the patient's body as a stimulus to the further production of antibodies.

If we admit that antigen may persist for a very long time after it has been injected the experiment of Wassermann and Citroën assumes a very considerable importance. These workers injected typhoid bacilli beneath the skin of a rabbit's ear and endeavoured to prevent the transport of the bacilli to other parts of the body by putting a ligature, which was not removed for several hours, around the base of the ear. Nine days later the serum was titrated for antibodies and the ear was amputated. The amputation was immediately followed by a sharp drop in the antibody content of the rabbit's serum. This experiment seems to show that if the antigen can be removed or destroyed, the productions of antibodies will cease. Evidence of a more indirect kind is afforded by the following observations.

After the first year of the war the prophylactic use of tetanus antitoxin was so successfully enforced that almost all wounded men received at least one and often three or four prophylactic injections of serum. Nevertheless, cases of late tetanus did occur and occasionally were of considerable severity. In these severe cases I was in the habit of injecting a large dose of serum into a vein. In a large majority of cases no signs of anaphylaxis made their appearance, but in some patients the intravenous injection was followed within a few minutes by the appearance of a generalized urticaria. In other cases there was no widely spread rash, but one or more isolated wheals appeared for a few seconds on the chest or arms, corresponding in number to and, I believe, occurring at the actual situations of the subcutaneous prophylactic injections. These sharply localized reactions occurring at the site of the prophylactic injections can be explained by the existence at these spots of a surviving and limited focus of antibody formation, and I am inclined to suppose that such small focus of antibody formation was situated at the spot where a trace of the originally injected antigen still persisted and still acted as a sufficient stimulus for the production of a small quantity of antibody.

CONCLUSION.

In the way of general conclusions I have not much to say, but it appears to me that in these serum reactions we have to do with phenomena as interesting as any to be found in the whole field of biological science, and that in the study of these phenomena we are confronted with problems of fundamental importance not only to pathology and clinical medicine, but to every branch of biology. The general phenomena of these serum reactions have been well known to us for twenty years, and during these last twenty years there has been very little progress and very little effort towards the solution of the problems which underlie these reactions. Progress in technique there has been and much ingenuity has been directed towards the improvement of existing methods and the application of methods found useful in cases of one sort of disease to the diagnosis of some other sort of disease. A great deal of good and useful progress has been made, and very valuable, as aids to diagnosis, the serum reactions have proved themselves to be. But the great practical value of these reactions in diagnosis and the natural desire to invent a serum test for some disease, not as yet provided with one, has perhaps diverted our attention and our efforts from the big problems which lie in front of us. Some of these problems and difficulties I have mentioned to-day and I have tried to pick out from the great mass of experimental data a few observations which seem to me to have a bearing on some of those larger and more general problems which have yet to be solved.

DISCUSSION.

Dr. C. E. DUKES (London) pointed out that there were apparent exceptions to the specificity of antibody response. Certain strains of the atypical paratyphoid group were found by him to be agglutinated to a much higher titre by antiserum prepared against kindred strains than by homologous antiserums. A non-fermentative type might be agglutinated by a serum prepared against a fermentative type, and vice versa, showing apparent lack of specificity.

Dr. J. F. MACKEDDIE (Melbourne) said that Professor Dean touched on the question of the persistent positive Wasserman reaction, and one had often been in difficulties about that matter. There was no question that one had in some cases to ignore this persistent positive Wassermann, and by various ways relieve the patient of any anxiety, which was not an easy matter. It was very upsetting to one brought up in the opsonin faith to hear that the complement fixation test in tuberculosis depended on an excess of antibody that would actually constitute a negative opsonin.

Dr. BEGG remarked that the subcutaneous injection of tuberculin was a very accurate method of diagnosing tuberculosis and had seldom failed in his experience. In his practice he had often watched patients with positive Wassermann reactions who showed no symptoms of syphilis though carefully observed for thirty or forty years. He asked Professor Dean for an explanation of the reason why a treated patient, found to be negative on two or three occasions, subsequently yielded a positive reaction.

Professor HASWELL WILSON (Birmingham) pointed out that if a quantitative relationship existed between the toxin and antitoxin production, it was difficult to understand why an immunized horse should continue to produce antitoxin, as demonstrated by successive bleedings, even after all injections of antigen had been discontinued.

Dr. DA FANO (London) asked if Professor Dean could throw any light on the essential nature of the antibodies which were examined by serological tests.

Professor DEAN, in reply, declared that we were still ignorant of the essential nature of antibodies. Ehrlich's hypothesis, although it appeared to fit the facts, did not really explain them. Phenomena which were observed in test tubes appeared to obey certain laws, but as yet there was no satisfactory explanation of the machinery which set the reactions going. Many of the other questions asked were incapable of a definite answer at the present time. He had put forward in a tentative fashion the hypothesis that a positive serological reaction signified the continued presence of antigen and welcomed the discussion stimulated by his remarks.

MEDICAL MYCOLOGY.

BY

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At the present time very little importance is given to the higher fungi, attention being paid almost entirely to the lower fungi or bacteria. In fact the great rôle played by the higher fungi in human pathology is doubted by many authorities. It is interesting to note, however, that medical mycology came into existence long before bacteriology. It may be said to have begun in 1839 when Langenbeck discovered the fungus which is the cause of thrush; he found it at the autopsy of a case of typhus, and he believed that the fungus was the cause, not only of the white patches, but of the disease itself, typhus. The fungus was more thoroughly investigated later by Charles Robin, who called it *Oidium albicans*. For many years, however, medical men did not believe in the fungus being the real cause of the condition, and as late as the seventies one could find in a well known medical book published at the time the following statement: "Thrush is due to the pathological secretion of the oral mucosa, but there have been mycologists who have put forward the very peculiar hypothesis that the disease is caused by a fungus."

In the same year that the fungus of thrush was discovered by Langenbeck another very important fungus was found—the fungus of favus, by Schönlein. In 1844 the fungus of ringworm was found by Gruby and Malassez. Mycology continued to attract attention until the eighties of last century, when the great discoveries by Pasteur and Koch in the field of bacteria brought bacteriology to the forefront and mycology was placed in the background, and it has unfortunately remained there until the present date. I have no doubt, however, that in future years the great importance of mycology will be recognized. Let us remember, for instance, that, at least as regards tropical medicine, the part played by fungi is an extremely important one; it suffices to mention that more than 20 per cent. of tropical diseases *sensu stricto* are caused by fungi higher than bacteria.

GENERAL REMARKS AND CLASSIFICATION.

As is well known, the vegetable kingdom is usually divided into four large groups or *phyla*: the Thallophyta, the Briophyta, the Pteridophyta, and the Phanerogamae.

The *Thallophyta* may be defined as being vegetal organisms with a cellular structure which is usually little differentiated, and reproducing, either asexually by division and spore formation, or sexually after conjugation, by oöspores.

Fungi (Fungaceae) form a class of the Thallophyta (the other class being the Algae) and are characterized by the absence of the green colouring matter known as chlorophyll. They may be defined as filamentous vegetal organisms not possessing chlorophyll, and reproducing, either asexually by division and by spore formation, or sexually after conjugation, by oöspores.

They may be divided into two large groups:

1. Of minute dimensions, reproducing generally by division: lower fungi or bacteria (Schizomycetaceae).
2. Of larger dimensions, reproduction by asexual or sexual spores—fungi *sensu stricto*—higher fungi (Mycetes).

At the present time the term "mycology" is limited to the study of the higher fungi, while "bacteriology" deals with lower fungi.

Fungi, not possessing chlorophyll, are unable to build up their food from the carbon dioxide of the air, and must obtain it from larger vegetal organisms, from animals, or from decaying matter. Fungi may be *parasitic* or *saprophytic*: parasitic fungi grow and obtain their food from living animals or living plants; saprophytic fungi grow and feed on dead plants or decaying matter in general. In practice the term "saprophytic" is used to denote a fungus which is not pathogenic, although deriving its food from the host.

Some fungi are always saprophytic, others always parasitic; but there are also fungi which are *facultative parasites*—that is, they are saprophytic, but under certain conditions they become parasitic. The animal or plant on which the fungus grows is said to be the "host."

As in the case with the flowering plants, a fungus consists of: (1) a vegetative part (thallus, mycelium) devoted to the acquisition of food; (2) a reproductive part. The vegetative part consists of very fine filaments or threads called "hyphae"; a collection of hyphae is known as mycelium (vegetative part of the fungus). A hypha is a hollow cylindrical tube containing protoplasm and divided at intervals by partitions called "septa." It may be of different shapes—straight, curved, banana-like. Hyphae have peculiar morphological characteristics of great importance for classification—for instance, the peculiar swellings on the hyphae of the Borellineae fungi and the clamp connexions of the Basidiomycetae.

Reproduction.—Fungi reproduce by spores, which may be said to represent the seeds of the flowering plants. A fungus spore is merely a spheric, oval, or elongated cell, with a thin wall, and containing protoplasm. If a spore meets with favourable conditions it germinates by growing out a hypha which develops into a mycelium.

Fungi are classified principally according to the manner in which the spores are produced and their shape and colour. There are several kinds of spores, some sexual, some asexual.

(1) *Gonidia* (endospores *sensu stricto*, ascospores *pro parte*). These are spores which are not born free; they are formed or born in a case or receptacle which is often terminal. When the spores

are 2, 4, 8, or a multiple of 8, they are generally called ascospores, and the receptacle an *ascus*.

(2) *Conidia* (or exospores). These are spores which are born free, not in a case or receptacle; the branch bearing them is called a *conidiophore*. Conidia originate asexually from the mycelial threads by a process of budding, septation, or abstriction. Conidia may be pedunculated or non-pedunculated, lateral or terminal.

(3) *Arthrospores*. These are spores formed simply by a process of segmentation and disarticulation of a mycelial hypha. The chlamydospore is merely an arthrospore of large dimensions undergoing encystment.

(4) *Hemispores*. The terminal portion of a hypha becomes differentiated, forming an ampulliform structure called protoconidium, which later divides into several segments or deuteroconidia which are the true reproductive spores.

(5) *Zygospores*. These spores result from a conjugation of two cells (gametes) which are morphologically identical in shape and do not show any sexual differentiation. The two gametes come into contact and unite, forming a large, very resistant cell called "zygospore."

(6) *Oospores*. These result from the conjugation of two sexually differentiated elements—the male element, *antheridium*, and the female element, *oösporangium* or *oögonium*. The oösporangium is generally a thick capsule with pores, and it contains several roundish protoplasmic masses—female gametes, macrogametes, oöspheres.

The conjugation takes place as follows: the male element comes into contact with the oösporangium and sends a protoplasmic process through it. In certain cases the antheridium divides into several motile bodies—spermatozoids, antherozoids—which fertilize the female gametes.

Classification of Fungi.

Fungi may be separated into two large divisions:

A. Vegetative body under form of a multinucleate, naked plasmodium—Mycomyetes.
B. Vegetative body usually filamentous—Eumycetes.

Fungi parasitic of man belong to the Eumycetes, which may be subdivided as follows:

Class I. Reproduction by free-born spores (conidia) which are never contained in a case or receptacle; septate mycelium—*Fungi imperfecti* or *Hyphomycetes*.
Class II. Reproduction by ascospores; mycelium septate when present—*Ascomycetes*.
Class III. Mycelium non-septate in vegetative stage; represented often by zygospores—*Phycomycetes*.
Class IV. Reproduction by basidia; septate mycelium—*Basidiomycetes*.

The fungi imperfecti, the most important group from the medical point of view, may be divided as follows:

Order 1. Mycelial hyphae bacilliform. *Microsiphonales* Vuillemin, 1910.
Order 2. Reproduction by thallospores. *Thallosporales* Vuillemin, 1910.
Order 3. Reproduction by hemispores. *Hemisporales* Vuillemin, 1910.
Order 4. Reproduction by conidia, *sensu stricto*. *Conidiosporales* Vuillemin, 1910.

Biological and Biochemical Characteristics.

Recent investigations have shown numerous analogies with the lower fungi (bacteria) as regards production of toxins and antibodies. Auchair and Verleac have obtained, for instance, a toxin soluble in ether from *Nocardia bovis* which they call "actinomycetine."

The injection of a saccharomyces culture into a rabbit will induce production of a large amount of agglutinin for that particular fungus; unfortunately in many cases a large amount of non-specific agglutinins for other species is also present. Vaccines have been prepared using cultures of Nocardias and Monilias.

The Higher Fungi as Cause of Disease.

The higher fungi may attack any organ and system of the human body, the integumentary system being the most frequently affected and the nervous system the most rarely. It would take too long to discuss seriatim the numerous affections of mycotic origin, and I will limit myself to only touching on thrush, bronchomycoses, tonsillomycoses, and certain external mycoses.

Thrush.

In all textbooks it will be found stated that thrush is due to the fungus *Oidium albicans* Robin. Since 1906, in a series of researches carried out in tropical countries and in the temperate zone, I have endeavoured to demonstrate that the etiology of thrush is far from being so simple, and that the condition is not caused by one fungus only, but by a number of different fungi, and that in reality the term "thrush" does not cover one affection only, but a group of clinically similar conditions due to different fungi.

Fungi found in Thrush.—The fungi I have so far isolated from cases of thrush, in the tropics and in temperate climates, may be classified as follows:

Class, Fungi Imperfecti; Subclass, Hyphales.—Genus *Monilia* Persoon (several species). Genus *Oidium* Link (three species). Order Thallosporales—family *Oösporaceae* Saccardo. Order Hemisporales—genus *Hemispora* Vuillemin (one species).

Class, Ascomycetes; Subclass, Protoascomycetes; Order Saccharomycetales.—Family *Endomycetaceae* Rees—genus *Endomyces* Rees (one species); genus *Saccharomyces* Meyen (one species). Family *Saccharomycetaceae* Rees—genus *Willia* Hansen (one species).

Fungi of Genus Monilia Persoon.

These are the fungi most commonly found in thrush. The botanical description of these fungi has been given in my previous papers as well as in the *Manual of Tropical Medicine* by Chalmers and myself. It suffices to say, from a practical point of view, that the fungi of the genus Monilia in the meaning of Pinoy and other mycologists, are characterized principally by the following features. In the lesions the vegetal body (thallus) is composed of mycelial threads of rather large size, often showing arthrospores, and numerous free oval or roundish budding yeast-like forms—in cultures, especially on solid media, mostly roundish or oval budding elements are seen, while mycelial filaments are very scarce or absent. These fungi, as a rule, ferment with production of gas, glucose, and often other sugars. The only Monilias I know of which do not attack any sugar or other carbohydrates are *Monilia zeylanica* Castellani and *M. zelanoides* Castellani.

There is little doubt that the original fungus *Oidium albicans* C. Robin 1853 belongs in reality to this genus, and its correct name is therefore *Monilia albicans* (C. Robin 1853). The term *Oidium* or *Monilia albicans* has been used in the past to cover a number of different fungi, as proved by the widely different descriptions of it given by different authors. For instance, some observers state that the organism liquefies gelatin, others deny that it possesses such action. Certain authorities describe it as coagulating milk, others as not having any action on this medium, etc.

The more important Monilia fungi I have found in thrush may be separated into ten groups or types. The various types can be easily differentiated by their action on the following carbohydrates: glucose, levulose, maltose, galactose, lactose, saccharose, inulin, and dextrin.

Fungi of the first group (*M. balcanica* type) produce gas in glucose only.
Fungi of the second group (*M. krusei* type) produce gas in glucose and levulose only.
Fungi of the third group (*M. pinoyi* type) produce gas in glucose, levulose, and maltose.
Fungi of the fourth group (*M. metalondinensis* and *albicans, sensu stricto*) produce gas in glucose, levulose, maltose, and galactose.
Fungi of the fifth group (*M. tropicalis*) produce gas in glucose, levulose, maltose, galactose, and saccharose.
Fungi of the sixth group (*M. guillermondi*) produce gas in glucose, levulose, galactose, and inulin.
Fungi of the seventh group (*M. guillermondi*) produce gas in glucose, levulose, galactose, and inulin.
Fungi of the eighth group (*M. pseudo-tropicalis*) produce gas in *lactose* in addition to other carbohydrates.
Fungi of the ninth group (*M. pseudo-tropicalis*) produce gas in *dextrin* in addition to other sugars.
Fungi of the tenth group (*M. zeylanica* type) do not produce gas in any carbohydrates.

Further details on the classification of the various species of the genus Monilia may be found in the *Manual of Tropical Medicine* (Castellani and Chalmers, third edition, pp. 1070-1092). It must be remembered that a certain number of fungi of the genus Monilia have not permanent sugar reactions, and therefore for purposes of classification and comparison such fungi should be investigated, using only recently isolated strains.

Fungi of genus Oidium Link, *emendavit* Pinoy.—This genus is morphologically closely allied to Monilia, but mycelial threads are very abundant both in lesions and in cultures, and budding, yeast-like cells are rare. Fungi of this genus may occasionally induce an acid fermentation, but do not produce gas in any carbohydrate. I have found fungi of this genus in certain cases of thrush in the tropics

and in the Balkans, but, so far, not in England. I have isolated three species: *Oidium matalense* Cast., *O. asteroides* Cast., and *O. rotundatum* Cast. It is interesting to note that I have found the same species in cases of mycotic tonsillitis, and in the expectoration of certain cases of bronchitis, while I have observed *O. rotundatum* and *O. asteroides* also in the stools of certain cases of enteritis. The description of these fungi may be found in previous papers by me, as well as in Castellani and Chalmers's *Manual*, third edition (pp. 1093-1096).

Fungi of genus Hemispora Vuillemin.—These fungi are characterized by the presence of abundant mycelial hyphae, some of which are conidiophores. Each conidiophore terminates into an ampulliform or sausage-like structure, which is called deuteroconidium. So far only one species of this genus has been found in cases of thrush: *Hemispora rugosa* Cast. This fungus was first isolated by me from a case of mycotic tonsillitis in 1910, and observed in a case of thrush by Pijper in 1915. Two varieties can be distinguished: one liquefying gelatin, the other having no such action on the medium. Botanical details of this fungus have been given in various papers by me and by Pijper, and may be found also in Castellani and Chalmers's *Manual* (pp. 1108 and 1743).

Fungi of the genus Willia Hansen.—These fungi are characterized by the peculiar bowler-hat shape of their ascospores. I isolated a fungus belonging to this genus in Macedonia from a case of thrush in a gipsy. In sugar broths it formed a thick pellicle containing air bubbles. It produced gas in glucose and levulose only. Old cultures on solid media contained asci with two to four spores of the peculiar hat-like appearance. The fungus seemed to be somewhat similar to *Willia anomala* Hansen, but the investigation of it is not yet complete.

Fungi of genus Endomyces Link.—These fungi are on superficial examination extremely similar to those of the genus Monilia, budding elements and mycelial threads being found in the lesions, and mostly budding elements in cultures. There is, however, a very important character which differentiates these fungi: in old cultures of endomyces asci are present. Only once have I come across a case of thrush due to a true endomyces, in Macedonia in 1917. I considered it to be *E. vuillemini* Landrieu.

Fungi of genus Saccharomyces Meyen.—In the Balkans I found a case of thrush due to a typical saccharomyces, which I have only recently studied. Fungi of this genus are characterized by the vegetative body consisting only of budding elements, and by the presence of asci in cultures. The saccharomyces isolated by me ferments with production of gas, glucose, levulose, galactose, maltose, and saccharose. It does not clot milk, which, however, may occasionally become acid. Gelatin and serum are liquefied.

Clinical Varieties of Thrush caused by above Fungi.

I have always endeavoured to study the cases of thrush I have observed both mycologically and clinically, to see whether different groups of fungi are causing different types of thrush. In my experience two principal varieties of thrush may be distinguished: (1) The white, or white-greyish type. By far the most common; characterized by the cream-white colour of the patches, and practically the only type of thrush found in temperate zones. (2) The yellow, or yellow-brownish type; characterized by the yellowish, occasionally brownish, colour of the patches. The first type may be caused by any type of the genus *Monilia* (except *M. zeylanica* Cast. and *M. zeylanoides* Cast.), by *Oidium matalense* Cast., by *Endomyces vuillemini* Landrieu, and by fungi of the genera *Saccharomyces* Meyen and *Willia* Hansen. The second type is caused by *M. zeylanica* Cast., *M. zeylanoides* Cast., *Oidium rotundatum* Cast., and *Hemispore rugosa* Cast.

Conclusion.—Thrush is not caused by one species of fungus only, the so-called thrush fungus or *Odium albicans* Robin, as generally stated. It is caused by a number of different fungi, some of which are botanically very far apart from each other, and belong to separate species, genera, and families. The term "thrush" covers in reality a group of clinically similar conditions, rather than one only; two principal types may be clinically distinguished, the white or grey-white type, extremely common, and the yellow or yellow-brownish type, of rare occurrence.

BRONCHOMYCOSES.

In the tropics bronchial affections due to the higher fungi are quite common, but in my experience they are also met with in temperate zones.

I may perhaps be allowed to say a few more words about the following varieties: (1) Broncho-moniliasis, (2) broncho-mucormycosis, (3) broncho-aspergillosis, (4) broncho-penicilliosis.

Broncho-moniliasis.

This variety of bronchomycosis was described by me in 1905 in Ceylon. The condition has recently been found in many tropical and subtropical countries, and even in the temperate zone. Pijper has described cases in South Africa, and Chalmers and MacDonald and Fahra had a number of cases in the Sudan and Egypt, while Iacono has found several cases in the south of Italy, and several cases have recently been observed in this country. The condition appears to be caused by several different species of the genus Monilia, which I have described on other occasions (see also Castellani and Chalmers's *Manual of Tropical Medicine*, p. 1886).

Clinically a mild type and a severe type of the malady may be distinguished, with, of course, a number of intermediate cases. In the mild type the general condition of the patient is good, there is no fever, and he simply complains of cough. The expectoration is muco-purulent, often scanty, and does not contain blood. The physical examination of the chest is negative or reveals only a few râles. The condition may last for several weeks or months, and may get cured spontaneously, or, continuing, may turn into the severe type.

The severe type closely resembles phthisis. The patient becomes emaciated, there is hectic fever, and the expectoration is often bloody. The physical examination of the chest may show patches of dullness, fine crepitations, and pleural rubbing. This type may be fatal.

The treatment consists in giving potassium iodide, with which glycerophosphates and balsamics may be associated. It is interesting to note, however, that in certain cases potassium iodide has practically no beneficial action whatever.

It is essential to differentiate primary broncho-moniliasis from secondary broncho-moniliasis, which is often found, for instance, in tuberculous cases. It is also necessary to differentiate pathogenic monilias from saprophytic monilias with identical biochemical characteristics. A pathogenic monilia isolated from a true case of bronchomycosis when injected into the lung of a rabbit will produce a most characteristic nodular condition of the lungs, while a saprophytic monilia will not cause any lesion.

Broncho-mucormycosis.

While I was in Macedonia a Serbian was sent to me with the diagnosis of tuberculosis. The patient was very anaemic, very weak, and was losing flesh rapidly; there was slight fever at night; the sputum was mucopurulent. Examination of the chest revealed nothing except a few coarse râles. Examination of the sputum for tubercle bacilli was constantly negative; instead, a few mycelial segments were noticed on several occasions. Glucose agar tubes and other media were inoculated and a fungus was isolated which at first showed cultural characters somewhat monilia-like; in subcultures, however, the characters of a mucor appeared—a yellowish ovoid-shaped "columella," sporangium globular, about 50 microns in diameter, of yellowish colour; spores elliptical and smooth. How did this patient get infected? It is interesting to note that he was in charge of horses and often had to remove horse-dung. As is well known, *Mucor mucedo*, L., is extremely common in horse-dung.

Broncho-aspergillosis.

I have seen several cases of this condition in the tropics, a case in an island in the Adriatic, another in Macedonia. These two cases had been diagnosed as tuberculosis; from one *Aspergillus fumigatus*, Fresenius, was grown; from the Macedonian case a fungus very similar or identical with *Sterigmatacystis nigra*, Cramer, was isolated. In France, as is well known, a peculiar bronchial aspergillosis is common among pigeon breeders (*gaveurs de pigeon*), who

fill their mouths with grain and blow it into the mouths of the pigeons. The grain contains spores of various aspergilli and after a time most *gaveurs* become infected.

Broncho-penicilliosis.

During the war a Serbian soldier was sent to me with the diagnosis of tuberculosis. He was wasting and had serotine fever. The expectoration was muco-purulent, and occasionally bloody. Examination for tubercle bacilli was constantly negative. A few mycelial threads were present. A fungus was grown with the characters of *Penicillium crustatum*, L. Potassium iodide acted satisfactorily.

TONSILLOMYCOSES.

Mycotic affections of the tonsils are far from being rare, especially in tropical countries. The more chronic conditions, especially of the crypts, associated with nocardia-like and leptothrix-like fungi, have been known for many years, but there are certain acute mycological affections which I have described during the last fifteen years, and which not rarely have been mistaken for diphtheria—namely, tonsillar moniliasis, tonsillar oidiomycosis, and tonsillar hemisporosis.

DERMATOMYCOSES.

The rôle played by fungi in diseases of the skin is of extreme importance; it suffices to bear in mind the various trichophytoses, the blastomycoses, the sporotrichoses, the mycetomas. It is interesting to note, however, that though, of course, during recent years the all-important rôle played by the higher fungi in dermatology has been amply recognized, not many decades ago most authorities denied them any importance, some considering such organisms to be merely saprophytes, and others going so far as to state that the so-called fungi found in the epidermis and the hairs did not exist, these structures merely representing a granular degeneration of the epidermal cells. These affections may be separated to a certain extent into two groups: (1) The trichomycoses. (2) The dermatomycoses *sensu stricto*.

I shall limit myself to saying a few words on five little-known conditions I have investigated: aspergillomycosis of the beard, cryptococcosis epidermica, accladiosis, furunculosis cryptococcica, and pruritus ani of mycotic origin.

Aspergillomycosis of the Beard.

Aspergillomycosis of the beard and moustache appears under the form of minute dark-greyish nodules, one or several on each individual hair. The first case I saw in equatorial Africa in 1902 in an Indian merchant; later Chalmers and myself observed several such cases in Ceylon, and recently I have observed a case in an Italian residing in this country. The fungi found are generally of the aspergillar type, but occasionally organisms of the genus Penicillium may be seen. The simplest treatment consists, of course, in shaving, but if the patient does not wish to shave, turpentine will be found useful.

Cryptococcosis Epidermica.

Some years ago I noticed on the skin of one of my bungalow servants in Ceylon several brownish dirty-looking patches, which looked very much like dirt. He told me, however, that they did not disappear on using soap. I made a scraping and saw that these patches consisted of a large number of budding cells which I believed to be saccharomyces. I found the same patches, not only in other natives, but also in Europeans, especially on the chest and arms, and called the condition "saccharomycosis epidermica," which term I changed later into the more correct designation "cryptococcosis epidermica." I did not succeed in growing the fungus. Chalmers and others have confirmed my findings in the Sudan and North Africa, but the organism has not yet been cultivated. As to treatment, ordinary soap will not remove the patches; sand soap occasionally does. In obstinate cases the patches may be touched with an alcoholic solution of salicylic acid and then a salicylic-sulphur ointment may be applied. Cases of the same condition I have in recent years observed in the South of Europe.

Accladiosis.

This dermatomycosis, described by me some years ago, is caused by a fungus of the genus Accladium. I grew the fungus from the lesions and sent cultures to Professor Pinoy, of the Paris Pasteur Institute, who kindly described it botanically, and honoured me by calling it after my name. I quote his description:

"The growth on artificial media (such as carrot, potato, glucose-agar) consists of many small roundish masses, which later on may coalesce, and are covered by spiculated formations, giving them a prickly appearance, and consisting of erect, straight filaments, parallel to each other, or at times interlacing. These filaments are approximately 2 microns in diameter, and carry laterally pseudoconidia of variable shape, cylindriform, pyriform, or spherical, attenuated in size at their points of insertion. Most of these pseudoconidia are 4 microns in length, and have a breadth of 3 microns. This type of fructification recalls the type Accladium described by Bodin in certain species of the genus Trichophyton (Malmsten, 1848). These pseudoconidia become detached and then develop by sprouting, and mycelial filaments are formed. Certain filaments produce spherical chlamydospores arranged in small strings, as found in certain fungi of the genus Fusarium. These small chains of chlamydospores are very frequently terminal, the dimensions being variable—8 to 10 microns."

The affection is observed in Ceylon and the Federated Malay States, and during the war I found a case in Macedonia. Clinically this dermatosis is very characteristic; in a well marked case ulcerative lesions are present all over the body; the ulcers are roundish or oval, sharply defined, and with a red granulating fungus. There is often a fairly abundant purulent secretion, which dries up in thick bright yellow crusts covering the ulcers. Occasionally gummatous nodules and furuncle-like lesions are seen. The course of the disease is very long, and generally there is very little or no tendency to spontaneous cure. Potassium iodide when given in full doses is generally successful.

Furunculosis Cryptococcica (Folliculitis decalvans Cryptococcica).

During the last two years I have come across three cases of a peculiar pyosis, which is in all probability of mycotic origin. I will give elsewhere a complete description of the affection; I will limit myself here to only mentioning a few points in connexion with it. All the three cases had been considered to be ordinary cases of chronic furunculosis, and were treated with staphylococcus vaccine for many months without any definite improvement. The lesions in two of them were localized to the scalp, forehead, and neck, in one case scattered all over the body in addition to the scalp. In a well marked case one observes on the scalp some follicular pustules which may be flattened or conical, each pierced by a hair; in addition, fairly large baggy swellings may be present which later open by one or several openings. The hair falls off and patches of baldness are left, and are permanent. Lesions practically undistinguishable from boils may be present on the face and body. The bacteriological examination gives the following result: A staphylococcus is easily grown from all the lesions, but in addition, using mycological methods, I have grown a higher fungus—a cryptococcus. I believe the cryptococcus and not the staphylococcus to be the real cause of the condition, for the following reasons: (1) Staphylococcus vaccines do not induce any improvement of the lesions. (2) Potassium iodide in large doses is most beneficial and may cure the condition. It is well known that potassium iodide has no action on staphylococcal infections, in fact it renders them worse, but it has a specific action on many mycoses.

Pruritus Ani of Mycotic Origin.

The enormous number of different drugs, ointments, and lotions recommended in the treatment of pruritus ani clearly shows that the condition must be of very different etiological origin. This, as a matter of fact, has been recognized for many years, and several types of pruritus ani have been differentiated, including a *bacterial* type, certain authorities believing the condition to be of streptococcus origin. I should like to call attention to a variety of pruritus ani which in all probability is of *mycotic* origin. During the last eleven years I have had the opportunity of examining and investigating 49 cases of so-called pruritus ani, and in 8 cases (15 per cent.) I have grown

from scrapings of the anal-perianal region, using mycological methods of cultivation, fungi of the genera Epidermophyton and Trichophyton—namely, *Epidermophyton cruris* Castellani 1905 (= *E. inguinalis* Sabouraud 1907) in 5 cases; *E. rubrum* Castellani 1909 in 2 cases; a Trichophyton not yet classified in one case. The condition may be compared to the well known pruritus interdigitalis pedum, which is due to the localization in the skin of the toes of fungi of the genera Epidermophyton and Trichophyton. These fungi remain in a dormant condition for years, and apart from the pruritus they give rise to scarcely any other clinical symptom; as a rule there is no sign pointing to a ringworm condition, but a slight desquamation may be present and occasionally fissures. A somewhat similar process takes place apparently in the anal-perianal region. Fungi of the genera Epidermophyton and Trichophyton are capable of localizing themselves there, giving rise to practically no objective symptoms, although on close examination not rarely small red infiltrated patches may be seen, and occasionally an eczematous dermatitis due to scratching may develop. None of my 8 cases presented acute symptoms of dhobie itch (tinea cruris, tinea inguinalis) of the inguinal region, but 6 gave a history of having suffered from it years previously. Two of the positive cases were suffering also from pruritus interdigitalis pedum; and in both cases *Epidermophyton cruris* was isolated from the scrapings of the skin of the toes.

In my experience pruritus ani of mycotic origin has no tendency to spontaneous cure. The fungus remains in the perianal region indefinitely, practically dormant, but giving rise to severe pruritus which may stop completely for certain periods of time.

Treatment.—I have found that silver nitrate is often very efficacious (arg. nitr. gr. xv to spir. aether. nitr. ʒj), but it should be used with great care. An ointment containing one or two grains of chrysarobin to the ounce is sometimes very effective. This, too, should be used with great care. Tincture of iodine may also be used. I have found a potassium permanganate lotion (gr. xxx to the ounce) useful, and also an ointment containing salicylic acid and sulphur (gr. x of each to 1 oz. of vaseline). When an eczematous dermatitis due to scratching is present, it is better first to use a soothing lotion such as lead lotion, and then when the acute symptoms of dermatitis have disappeared the antimycotic treatment should be started.

DISCUSSION.

Dr. CAWADIAS (Athens) said that he thought that not only in the tropics but in Europe also many more cases of fungus diseases could be found if they were looked for. Diagnosis was made principally by means of culture; it was not possible to find fungi in routine examination. Most cases were mistaken for tuberculosis or syphilis; an illustration of this was the finding of many cases of sporotrichosis and other mycoses in Paris during systematic research following the work of De Beurmann and Jougerot. An interesting point was the rôle of fungi in some cases of chronic ulcerative colitis met with in Greece. In one case monilia was the causative agent.

Dr. HASWELL WILSON pointed out that streptothrices and fungi were a much commoner cause of suppuration than had been generally recognized. He asked Dr. Castellani for information regarding the nature of the lesions of fungal infection in the kidney in rabbits, and the effects of vaccine therapy in human cases of infection due to fungi.

Dr. DUKES asked Dr. Castellani if he regarded the biological method he had described for the identification of sugars as an accurate one. He pointed out that profound changes took place when sugars were heated in the presence of peptone, leading often to the production of fermentable substances from which the organism could produce gas, though without action on the original carbohydrate. He suggested that the method had serious limitations since it was generally recognized that gas production was the most variable of an organism's attributes. In his opinion the method might have merit in determining the purity of a sugar provided careful precautions were taken against the changes incident on sterilization.

Dr. MACKEDDIE (Melbourne) sought information on the apparently successful treatment of fungoid conditions of the skin by vaccines. The lung nodules in rabbit's lung after intravenous injection of the fungus was stated by Dr. Castellani to be almost identical with tuberculous nodes, giant cells, etc.—it must be a very disconcerting result. He stated that fungoid pathological conditions must be much more common than they had any idea of—colonic, pulmonic, and skin.

Dr. MACKENZIE WALLIS (London) referred to the three points raised by Dr. Castellani, and which he advocated as a means of differentiation as to whether the fungus was parasitic or saprophytic. He cited examples where these points applied. In his opinion the study of fungi in disease should receive more general recognition, especially as diseases due to this cause appeared to be much commoner than was supposed.

Dr. Castellani's Reply.

In his reply Dr. CASTELLANI stated that though fungal diseases were commoner in the tropics they were not rare in this country, being found frequently in patients who had never been abroad. With regard to colitis, the present tendency was to regard such a disease as sprue to be caused by a dietary deficiency, but the frothy character of the stools was caused by a monilia which might or might not be the cause of the disease. To Professor Wilson he replied that not much structural change was found in the infected kidneys of rabbits, the lesions being caused by a blockage of the glomeruli and tubules by the fungus. In a general way the results of vaccine therapy were disappointing, but in cases of infection with nocardia, actinomycosis, and streptothrix the results were often satisfactory. To Dr. Dukes he replied that the sugar and peptone must certainly not be autoclaved together, and recommended filtration of the sugar solution to ensure sterility. He was of the opinion that the method might be of value clinically in the identification of excreted carbohydrate. To Dr. Mackenzie Wallis he replied that though vaccine treatment was often disappointing, good results could be obtained by large doses of potassium iodide: 30 grains of potassium iodide should be mixed with 30 grains of sodium bicarbonate, and glycerin or syrup added to prevent the formation of a precipitate. Such treatment gave remarkably consistent results.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

HAEMORRHAGIC PANCREATITIS IN A BOY.

A YOUTH aged 17 was sent in to the King Edward VII Hospital, Windsor, by Dr. Hornibrook of Gerrard's Cross, on account of a sudden attack of acute abdominal pain, which had come on four hours previously. His history gave little information, being only an account of vague epigastric discomfort for a few days.

Incision showed great oedema of the peritoneum of the lesser sac, but no fat necrosis. The pancreas was large, swollen, and infiltrated with blood clot. An incision was made into it and a swab taken for bacteriological examination. The gall bladder was dilated, and on being opened was found to contain thin faecal-smelling pus. The bladder was drained, but the boy died two days after operation. The culture from the pancreas and from the gall bladder yielded *B. coli*.

Pathological Notes by Dr. Elgood.

There was some loose blood and serum in the abdominal cavity but no visceral inflammation and no peritonitis. The pancreas was greatly swollen and softer in consistence than normal; it was dark purple in colour, with thin strands of lighter colour. Section shows that this condition is not uniform, for while at the tail the consistence is softer than normal, but not greatly so, there is obviously a good deal of blood in its interstices, and as the

head is approached the redness and softness increase, till the tissue is almost diffluent in places. The cystic duct was dissected down, and at the commencement of the common duct a probe was passed down to the duodenum. Though this traversed the duodenum, it apparently did so by accident, for closer examination suggested that the duct itself was blocked actually when in the walls of the duodenum, the block being caused by a chain of small gall stones (the largest the size of a pea) which were readily apparent under the mucous membrane. The pancreatic duct was observed close up to the obstruction, but the entrance of the main duct into the duodenum could not be satisfactorily made out.

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HEAT-STROKE: HYPERPYREXIA: RECOVERY.

THE following report of a case of heat-stroke which occurred in my practice in the country, with no cottage hospital or motor ambulance in the district, is of interest, and may be of assistance to any practitioner similarly placed who has not seen such a case.

On July 12th, about 1 p.m., whilst on my rounds, I was called urgently to see a farm labourer, aged 67, who had collapsed on his way home from his work in the fields about a quarter of an hour earlier, and had been carried to his cottage in an unconscious and what appeared a dying condition.

I found him lying on a couch absolutely unconscious, with a grey, ashen face; the breathing was shallow and irregular; the pupils were pin-point and fixed, and conjunctival reflex was lost. His body skin was dead white and mottled. The mouth and tongue were dry and hard. The temperature in the rectum was 109° F. His pulse was rapid, irregular, and bounding. He looked as if he would die at any moment.

I had him stripped and placed on an improvised bed. I sent his employer, the farmer, in his motor car to the nearest town, six miles away, for ice. Meanwhile, I had him sponged and douched with cold water and gave him a high enema of a quart of cold water. This was partly returned, but after ten minutes his bowel commenced to act, and with the assistance of massage along the colon a large quantity of faecal matter was evacuated. On arrival of the ice, some half-hour or so later, I had him rubbed down with blocks of ice, a block of ice placed behind the neck, and an ice-bag, improvised out of a sheep's stomach, placed on his head. An interesting detail was that we had to wait for a sheep to be killed to get this improvisation; but this was available by 2 p.m. from the local slaughter-house, where they were on the point of killing at the time.

The village nurse then gave him a high enema of ice water, and this was continued (washing out the rectum with three or four quarts of ice water) for over half an hour. By this time the rectal temperature had dropped to 100° F., and the patient showed signs of improvement, though he was still unconscious; the conjunctival reflex had returned and his breathing had become loud and stertorous. A quarter of an hour later the temperature was 97° F. and the patient showed signs of collapsing; his muscles were twitching and his pulse had become very feeble.

I then gave him a hypodermic injection of strychnine sulphate gr. 1/60, digitalin gr. 1/100, and had him transferred back to the couch and wrapped in blankets, with hot-water bottles placed to his feet and legs. The shivering rapidly ceased and he lay quiet but unconscious; his pulse steadily improved. The mottling of the skin, too, soon disappeared, and the temperature rose to 99° F. By this time it was 3.45 p.m. I left him with instructions to sponge with ice again if the temperature in the rectum rose above 103° F.

I saw him again at 7.15 p.m. and found him still unconscious, breathing quietly but irregularly, with a fast, weak pulse. I again gave him a hypodermic as before, and his pulse gradually improved. The temperature had risen to 101° F., but was not increasing. At 9 p.m. I had him carried from the cottage to a shelter near by that had been used by a tuberculous patient in the adjoining cottage.

At 9.15 p.m. he was given a few drops of brandy between his lips, and this, with the cool night air, seemed to revive him, and he suddenly regained partial consciousness and was able to swallow a little iced water. He tried to speak but could only stammer, and then was violently sick, vomiting up dark, bile-stained fluid. After this he seemed better, and was able to understand signs. No further treatment was considered necessary then and the village nurse sat up with him during the night. When I saw him at 11 a.m. the following day he seemed to have almost completely recovered and had slept well. His face, which even late the night before had been grey and cyanotic, was then flushed red and he was able to talk easily and had no pain. The temperature was normal. During July 13th he was able to take some barley water and weak tea, and was given a diaphoretic mixture. He vomited several times during this day; the conjunctivae were slightly yellow.

On July 14th he complained of severe headache; the temperature was normal, pulse 74 and good, but the vomiting had continued. I then gave him castor oil 3 ss. in brandy, which had a very good result. On July 15th, except for some giddiness, he was quite normal.

The treatment, which I had applied many times in India, seems to have had markedly good results despite the age of the patient and the improvised appliances. I think that had we attempted to remove him to hospital he would have died on the way. It is of supreme importance not to sponge with ice after the temperature drops below 100° F. in the rectum, and when this occurs to prepare against collapse by supporting the heart with digitalis and strychnine and hot-water bottles, and then to watch that the temperature does not again rise above 102° F.

Had the temperature not responded to the ice treatment I should have had recourse to bleeding, and if this failed, as so often it does owing to the viscosity of the blood, I should have given him an intravenous saline if possible. The recorded air temperature on July 12th was 92° F. in the shade, and this with a high reading of the wet bulb thermometer always spells danger from heat-stroke, as the main channel of heat reduction through evaporation of the perspiration is so greatly lessened. I should think, too, that the loaded state of the bowel helped to produce the catastrophe.

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Reports of Societies.

PROBLEMS OF OBSTETRICS AND GYNAECOLOGY.

THE Edinburgh Obstetrical Society held the first meeting of its eighty-fourth session on November 14th, with the President, Dr. LAMOND LACKIE, in the chair. The officials for the current session were appointed, Professor B. P. WATSON being elected president. The retiring president, before vacating the chair, delivered his valedictory address.

Dr. LACKIE thanked the society for the honour done him in electing him to the presidentship two years previously, and acknowledged the support given him by the different officials. He referred to the losses sustained by the society in the death of various members, in particular Sir James Affleck, Sir J. Halliday Croom, Dr. John Craig, and Dr. J. W. Ballantyne. He then proceeded to review the progress made in certain branches of obstetrics and gynaecology during the past twenty-five years.

In spite of the great amount of work done the problem of eclampsia still seemed as far as ever from solution; while this was so the recognition of the value of conservative treatment with a minimum of obstetric interference had led to a diminished mortality. The conclusions to which the discussion on this subject at the congress in Liverpool in 1923 had led were briefly considered. The speaker still regarded veratrone as one of the most valuable therapeutic agents at their disposal.

Going on to speak of Caesarean section, Dr. Lackie said that within recent years the operation had become so safe that there was a risk of its indications becoming too numerous, and he was convinced that it was occasionally undertaken without sufficient justification. Certain indications for Caesarean section were shortly reviewed, special mention being made of its employment in placenta praevia, concealed accidental haemorrhage, and in heart disease. Recent improvements in technique were briefly discussed.

There had been no change of note in the actual mechanical operation of induction of premature labour, but the induction of labour at full time was a commoner operation than formerly. Every case going beyond the expected date of parturition demanded careful investigation; for the induction of labour in such cases pituitrin was of great value and was more often successful than when used at an earlier stage in pregnancy. The danger of indiscriminate use of the drug during labour was pointed out.

Reference was then made to the induction of pneumoperitoneum and the use of x rays, which in America was regarded by some as a valuable aid in the diagnosis of pregnancy. On similar lines radiography had recently been employed in the diagnosis of tubal patency, and had been carried out by Rubin's method of gaseous insufflation of the uterus and tubes. Kennedy had also located the site of occlusion by radiographic examination after filling the

organs with a 20 per cent. solution of sodium bromide under pressure.

Several recent advances in gynaecology were then considered. The treatment of dysmenorrhoea was still a vexed question. At the British Obstetrical and Gynaecological Congress which met in Edinburgh in April last very diverse opinions had been offered by those who took part in the discussion. Professor Blair Bell had made a plea for a more accurate study of the pathology of the condition and a clearer definition of the various causes of pain, and had shown that with some fault in endocrine balance underdevelopment of the uterus was often an important factor and might manifest itself in different directions. Blair Bell had urged that in such cases effort should be directed towards stimulating the ovaries and uterus to fuller development, and with this in view advocated the use of thyroid and ovarian extract. For one form of underdeveloped uterus—the cochleate uterus—vaginal hysterotomy had been recommended.

A method of treating gynaecological disease which had within the last fifteen years come rapidly to the front was that of radiotherapy, with regard to the employment of which much difference of opinion had been expressed. As regards carcinoma, Dr. Lackie said that radiotherapy should be regarded not as an opponent of operation, but as an adjunct, or as an alternative where operation was contraindicated. The indications for radiotherapy in uterine fibroids, in chronic metritis, and in the uncontrollable haemorrhage of young women were shortly considered and certain contraindications and disadvantages discussed.

No branch of medicine had in recent years attracted so much attention as endocrinilogy. It had become recognized that many morbid gynaecological conditions had as their basis some aberration in endocrine function; as instances of such might be mentioned precocious or delayed puberty, certain of the menorrhagias of puberty and the menopause, and possibly certain cases of dysmenorrhoea and sterility. Our knowledge of the physiology of the ductless glands was as yet so incomplete that organotherapy was largely empirical and often disappointing. Undoubted benefit, however, followed the use of whole ovary extract in the artificial menopause, and that of corpus luteum in the nausea of pregnancy. The employment of pluriglandular therapy seemed more hopeful than the use of single gland extracts.

In conclusion Dr. Lackie said that with a fuller understanding of the physiology of the pelvic organs had come a more determined attempt to practise conservative gynaecological surgery, and he called attention to Giles's recent paper in this connexion. The importance of conserving ovarian tissue whenever possible was now recognized, and salpingostomy, the drainage of pus tubes, the opening up of occluded uterine ostia, and myomectomy were different operations the value of which had recently become appreciated.

A vote of thanks to the retiring President was proposed by Dr. HAIG FERGUSON and seconded by Dr. FORDYCE.

VARIATIONS FROM THE NORMAL TYPES OF HUMAN METABOLISM.

A JOINT meeting of the Manchester Medical Society and the Liverpool Medical Institution was held on November 7th at Manchester, with Dr. E. M. BROCKBANK in the chair.

Dr. C. J. MACALISTER said that medical men were constantly being brought face to face with conditions dependent upon imperfections of metabolism which were probably developmental or reversionary in origin. In the process of evolution man had attained to what might be regarded as an average physiological perfection, but variants from such a standard were frequently met with. Man's habits as to food must have undergone extraordinary alterations and his capacity for metabolizing almost any types of foods, whether animal or vegetable, had surely resulted from developmental changes in the modern as compared with the primitive types. The lower animals had fewer of these complexities; they were in the main carnivorous or vegetarian as the case might be. Man's ancestry included both of these classes, and a falling back to prototype might accord to him a lessened capacity for mixed metabolism. Dr. Macalister suggested that dietetic variations of metabolism resulted from reversions sometimes towards a carnivorous, sometimes towards a vegetarian type of ancestry. Coming from a common stock the carnivora would have a latent or undeveloped vegetarian metabolism; the vegetarian primate type on the other hand would have a latent carnivorous one. That hypothesis would explain the possibility of there being an adaptability to new dietetic conditions on the part of the primitive man as he emerged from the vegetarian or primate stage of his evolution. The latent carnivorous metabolism would become more and more highly developed and by degrees the organs and secretions for a mixed feeder would become evolved. Attention was directed to an association in individuals presenting polymastia with the presence of a long spiral appendix, sometimes presenting a funicular opening and thus resembling what was normal in the anthropoid apes. Although they were generally mixed feeders, presenting in most cases full powers of digesting and utilizing vegetable foods, these people were truly reversionary so far as their protein metabolism was concerned, and their flesh-containing meals required to be taken at much longer intervals than was the case in the average normal persons. Examples of this condition were given, but it was emphasized that the dyspepsias resulting from living on conventional lines were not uncommon, apart altogether from any visible evidence of arrested development such as the polymastia referred to. These dyspepsias depended on deficiencies of metabolism and elimination which brought them into the broad categories of gout, or, in other words, they resulted from idiosyncrasies or imperfections of metabolism, which were probably reversionary and had to do with the absence of normal metabolic rest periods.

Perhaps the most puzzling of all metabolic problems were those dependent upon sexual aberrations, cases in which males presented some degrees of femininity or where females had or came to possess certain male characteristics. These cases were not uncommon and they developed at varying periods of life, but in the human being they never attained to the extreme degrees met with among poultry or among insects.

Although determination of sex took place at the time of fertilization this did not imply that there might not be subsequent intersexuality due to the inheritance possessed by every individual, whether male or female, of hormones belonging to both sexes. There were dominant hormones belonging to and ruling the sex of the individual, and subdominant or latent ones of the opposite sex. This had been proved by operations involving removal of the essential internal secretions which directly influenced those organs or parts which developed or were capable of developing after the operation; that was to say, that males who were castrated approached the female type, whereas the females after the removal of the ovaries approached the male type. Apart from the results of operation there was plenty of clinical evidence of the same kind indicating that there was intersexuality in both sexes.

Many years of clinical observation had suggested that not a few of the disorders with which they as physicians had to deal depended upon inco-ordinations of functions brought about by mixed or approximating sexual metabolism. These were evidently cases which might be regarded as neutral or in which the sex dominant was delayed at all events until a later period of life. An example of this was found in the very interesting variety of dwarfism designated ateleiosis by Dr. Hastings Gilford. Examples of this were shown and particular attention was directed to the case of a man, aged 40, who after growing normally until 7 years of age, thereafter grew in height very slowly until he was about 30 years old, and he retained the characteristics of childhood up to a few years ago when the dominant male secondary characteristics became developed. Other cases were referred to where intersexualities became manifested at a later period of life associated with what were regarded as hysterical manifestations. Certain epileptics probably came into that class, also cases presenting psychoses and neuroses of

various types; Dr. Macalister regarded it as possible that gastric ulcer might have a similar origin, this impression being gained by the similarity which existed between the prodromal symptoms of that disease and those which frequently characterized the female climacteric of puberty.

Lacrymal Obstruction.

Mr. EDGAR STEVENSON read a short paper on lacrymal obstruction, and showed a number of lantern slides illustrating the anatomical relations of the naso-lacrymal duct, some features of the course of the disease, and the anatomy of West's operation. The main object of the paper was to point out that when naso-lacrymal obstruction had been definitely established the treatment by probes, styles, etc., was useless, and only converted obstruction into definite stricture, choice of treatment finally lying between excision of the diseased sac, or an endonasal operation, such as West's. He referred to some successful cases of the latter operation shown recently by Mr. Bride and Mr. Diggle, and suggested that the time had arrived when the ophthalmic surgeon must make himself acquainted with endonasal surgery.

Surgery of the Small Intestine.

Mr. FRANK JEANS read a paper on the surgery of the small intestine. He discussed the diagnosis of obstruction and the technique after excision of gangrenous bowel. He favoured a rapid anastomosis, as the cases with an enterostomy (whole calibre) starved quickly and often did not get well enough for the completion of the operation. He described a compromise between anastomosis on the one hand and, on the other, the Paul's tube method, to be used in the worst cases. Where there was much effusion of blood-stained fluid in the peritoneum he drained for twenty-four hours. He reviewed the factors contributing to post-operative paresis of gut, and attributed a large share of the blame to the pre-operative dose of castor oil, which he hoped would soon be obsolete.

CYANIDE FUMIGATION.

AT a meeting of the Section of Epidemiology and State Medicine of the Royal Society of Medicine held on November 23rd, the President, Dr. R. J. REECE, in the chair, Dr. P. G. STOCK read a paper entitled, "Some considerations on the use of hydrogen cyanide and allied substances, with special reference to international preventive medicine."

The author, having given a précis of the history of the subject, pointed out that the quarantine regulations adopted by the United States in 1920 imposed a definite requirement that all vessels engaged in trade with foreign ports should be fumigated not less than once every six months for the purpose of destroying rats. The regulations also stipulated that vessels should be fumigated *simultaneously* in all parts, and laid down the gaseous agents which were authorized. The regulations recognized that the oxides of carbon are efficient for the destruction of rats, but as they do not kill fleas or other insects these gases are practically excluded, and reliance is placed on sulphur dioxide or hydrogen cyanide—more popularly spoken of as hydrocyanic acid gas. An amendment published last January adds cyanogen chloride gas mixture to the list of authorized agents.

Dr. Stock then described the various methods in use for carrying out fumigation with hydrogen cyanide or allied substances, illustrating his account with a series of photographs and diagrams. He emphasized the magnitude of the task of efficiently treating a large vessel and called attention to the revision of the United States quarantine regulations which allowed an extension of the period of six months for the compulsory fumigation of vessels in the case of ships complying with the following conditions: (1) Vessels constructed so as not to favour or encourage the harbourage of rats. (2) Vessels plying regularly between ports not infected with plague. (3) Vessels regularly carrying no cargo, or cargo of such a nature or so packed or stowed as not to serve as rat food or rat refuge. (4) Vessels which have been regularly certified as loaded in stream from rat-free lighters or as complying with the regulations relative to fending off from docks, proper use of guards on lines and hawsers, raising or guarding of gangways and ladders, and docking at rat-free docks or wharves.

In the ensuing discussion, which was opened by Dr. A. K. CHALMERS and continued by Sir GEORGE BUCHANAN and Drs. WILLOUGHBY, WHITE, CHAPLIN, and KING (U.S.A. Public Health Service), there was some difference of opinion as to the relative merits of the sulphur dioxide and hydrogen cyanide methods. Dr. King pointed out that in the application of quarantine regulations a wide discretion was properly entrusted to experienced officers, that what was aimed at was the attainment of a practical result. There was no intention to force the cyanide process upon anyone. The sulphur method had certain disadvantages; its destructive action on property was largely dependent upon the amount of moisture present. The relative merits of the two methods had not yet been fully worked out, but it was of great importance that a trained personnel should be employed.

In his reply, Dr. STOCK observed that the danger of the cyanide process, so far as could be judged from past experience, had been a consequence either of gross carelessness or inexplicable neglect of simple precautions. Owing to the rapid diffusibility of the gas, the liberation of large volumes into the atmosphere at the conclusion of fumigation probably did not constitute an appreciable danger.

PYORRHOEA: ITS PREVENTION AND TREATMENT.

AT the meeting of the Odontological Section of the Royal Society of Medicine on November 26th, Mr. DOUGLAS GABELL presiding, a discussion took place on pyorrhoea and its prevention and treatment.

Mr. J. G. TURNER said that he regarded pyorrhoea as the result of an attack of various germs, chiefly of low virulence, on the alveolar and dental tissues. The germs harboured on the necks of the teeth and in the periodontal sulcus. Pyorrhoea was a dirt disease, the dirt being germs and sticky food débris; in the absence of dirt, no general disease could produce pyorrhoea. The first element in prevention was a healthy body, with the intestinal tract in good working order. The second was the use of a food which was not sticky. In view of the common use of fine ground sticky flour, the best thing he could suggest was that bread should be eaten stale, three or four days old. The dental arches must be as large and regular as possible, so that all forms of dental overcrowding were avoided. The teeth should be so arranged in these large arches that the neck of each tooth was cleansible in its whole circumference. The best way to obtain the necessary spacing was to extract the first permanent molars at the age of from 14 to 16, or earlier in the case of a quickly developing child. Malocclusion and traumatic occlusion did not frighten him in the least; the inevitable sepsis of the normal arch in the presence of our sticky food was a far more fearsome thing. For a cure he was sure that general treatment would not suffice, though in some cases it would ameliorate the condition. In local treatment, which was by far the more important factor, his objective was to clean, to render cleansible, and to teach the patient to clean. Properly to do the original cleaning, all tartar must be removed, and all rough fillings and overlapping edges smoothed away. The next step was to decide whether any teeth were to be extracted. Some teeth stood condemned by their looseness, some by the extent and inaccessibility of their pockets, and some by the extent of caries; extraction might also be necessary for drainage—that is, to ensure cleansibility. Alternate extraction was sometimes a useful method. If teeth eight, six, four, and two were extracted, and the remaining teeth rendered as nearly aseptic as possible, pockets could be dealt with by the excision of gum flaps, and a healthy mouth obtained; but even then, unless the patient was taught to clean every exposed tooth surface the recurrence of pyorrhoea was only a matter of time. In cleaning the teeth the

important thing was to get at the necks, therefore the brush covered only a small part of the ground. Waxed silk might be used, but this could only be drawn in the vertical direction; if used horizontally it cut into the gum. The best method was the use of worsted thread. Three-ply worsted was soft enough not to cut into the soft tissues, and thin enough to pass between the spaces of the teeth. After using the worsted he painted a weak tincture of iodine on the necks of all the teeth, but usually, as patients did not like iodine in the mouth, he followed this practice only every third day.

Mr. E. STURRIDGE said that he was astounded to hear Mr. Turner advocate the extraction of six-year-old molars. There was nothing more difficult to treat than a case of pyorrhoea with malocclusion caused by such extractions. The extraction brought about a change in the articulation which threw stress on the teeth, and the resulting condition could not be overcome by any local treatment whatever. If proper occlusion could not be secured there would always be pyorrhoea. He disapproved also of alternate extraction except where the alternate teeth were so diseased that there were no means of getting them healthy. In the treatment of periodontal tissue something more radical was needed than surface application of an antiseptic, and he claimed that only by means of ionic medication could the antiseptic be got into the tissues.

Mr. E. B. DOWSETT agreed with Mr. Turner that pyorrhoea was a dirt disease. The teeth which should be extracted were teeth which were hopelessly loose or in which the pockets could not be obliterated or the pus removed. The first determining consideration in cure was the state of the patient's health; if this was bad, it was generally an indication for more radical rather than more conservative treatment of the pyorrhoea. He thought it a good sign if the bone was dense, with the skiagrams showing sclerosis around the margins, and with hard bosses to be felt in the teeth; such cases stood a better chance than others in which there was no bone reaction. The efficiency of mastication was another important point. If the occlusion was bad, mastication must be bad also, and therefore the best cleanser of the mouth was not functioning. Local treatment was all summed up in the term "efficient hygienic drainage." Every particle of calculus, especially subgingival calculus, should be removed by means of the best scaler obtainable, and the gums then freely excised. He judged the depth of the pocket and excised down to its base. In the subsequent cleansing any antiseptic or astringent would serve. He used various kinds, first one and then another, and if one of them appeared to lose its effect it was a good plan to prescribe another. It was very important also to teach the patient how to rinse the mouth. To cut spaces between the teeth in order to facilitate cleaning was, he considered, dangerous practice. The smallest space, if there was an interlocking cusp, would admit the fibres of meat and other food, which might set up severe trouble. Spacing, if practised at all, should be limited to those teeth on which there was no bite.

Sir H. BALDWIN did not quite agree with Mr. Turner's remarks on the inception of pyorrhoea. In his opinion the first thing to become inflamed was the immediate free edge of the gum; this became infected by the ordinary micro-organisms of the mouth when it was low in tone through the absence of friction. Friction of the gum, best done with the tooth brush, would prevent pyorrhoea. The friction acted chiefly by vitalizing the tissue. It was an essential part of prevention, and an integral part of treatment. He would never think of extracting the six-year molars to prevent pyorrhoea, and if Mr. Turner really intended young practitioners to follow him in this respect he thought his teaching dangerous. Ionization was a valuable method; if a little cocaine were employed with the solution the pockets were soon rendered quite insensitive, and advantage could be taken of their distension after withdrawing the cotton-wool to remove much unsuspected tartar. He did not think tartar was the cause of pyorrhoea; he had seen many cases in which there was no tartar. As an antiseptic he recommended nothing more than saline water.

Mr. COLIN KEAY did not agree as to malocclusion or traumatic occlusion being a contributory cause; in his view it was one of the principal causes, and bacterial invasion was secondary. He always corrected malocclusion before scaling. Mr. F. W. BRODERICK believed the common factor in pyorrhoea to be a change in the equilibrium of the blood, a tendency to an excessive formation of alkali. Speaking with regard to disappointments experienced in vaccine treatment, he mentioned that Besredka, of the Pasteur Institute, had found that for cutaneous diseases—and pyorrhoea would come into this category—by painting a specially prepared vaccine on the skin much greater immunity was conferred than by injection into the blood stream. He had tried the method, and although he could not report the final results he found that the suppuration ceased almost at once, the inflammation of the gum subsided, and pain and discomfort were relieved. Mr. A. LIVINGSTON made the suggestion that whether worsted or any other thread was used, by tying a figure-of-eight knot it could be got into the little holes and made to scoop out anything that was there.

Mr. A. T. PITTS dissented from the view that traumatic occlusion was a factor in pyorrhoea and must be removed in order to treat the disease, although a very gross degree of malocclusion might play a part. If by the removal of the first permanent molars proper spacing could be ensured the practice might be justified, but very often it did not have this result, or what it yielded was the very slight spacing which was pernicious. He regarded it as a dangerous thing to advocate, and he also thought it dangerous to cut away spaces between the teeth.

Mr. F. N. DOUBLEDAY said that pyorrhoea could not be understood until it was known what were the different types of bacteriological infection which occurred in these pockets. Pyorrhoea was not a single condition.

Mr. FREDERICK HOBDAY spoke of the effect of friction of the teeth and gums from the veterinary point of view. Pyorrhoea, which was frequently met with in canine practice, was very rare among sporting dogs such as retrievers, which were accustomed to gnaw large numbers of bones, but it was common among dogs fed on soft food. He considered it a disease due to want of work for the teeth. It was also a disease of domesticity, rarely met with in creatures in the wild state. Dr. F. W. COLLINGWOOD believed that the disappearance of protective substances from the blood, and thereby the advent of pyorrhoea, was due to the want of balanced natural diet.

As many other members desired to take part in the discussion, it was decided that it should be resumed at the next meeting of the Section.

NORTH OF ENGLAND OBSTETRICAL AND GYNAECOLOGICAL SOCIETY.

Encephalitis Lethargica and Pregnancy.

A MEETING of the North of England Obstetrical and Gynaecological Society was held in Sheffield on November 16th, with Professor M. H. PHILLIPS in the chair, when Dr. HERD (Liverpool) described two cases of encephalitis lethargica associated with pregnancy.

The first case was a primipara, aged 24, who had no history of previous illness. The pregnancy was normal up to the thirty-sixth week. The patient then had headaches, albuminuria, and slight oedema of the ankles. She had treatment and showed signs of temporary improvement. A week later she had severe headaches, and a fit. When she was admitted to hospital her blood pressure equalled 130 mm. Hg, and she had albuminuria—9 grams of albumin per litre. There were no uterine contractions. The patient had six fits in six hours following admission—apparently typical eclamptic fits. Next day a living child was delivered. Later in the day rhythmic clonic contractions of the jaw muscles began. The temperature was slightly raised. The patient was restless and confused, and at the end of five days, as she was becoming worse, she was transferred to another hospital, where she died on the twentieth day after delivery. She had nystagmus, ptosis of the upper eyelid, and weakness of the facial muscles. On *post-mortem* examination the diagnosis of encephalitis lethargica was corroborated, and no evidence of toxaemia was found.

The second case was a primipara aged 28, who had been healthy up to the thirty-fifth week of pregnancy. On admission to hospital she was restless and excited; she had inco-ordinated clonic movements of the head and limbs present during sleep. Her reflexes were normal. Albuminuria amounted to 2 grams per litre. Chorea gravidarum was diagnosed and she was treated with parathyroid extract, calcium lactate, and sedatives. On the fourth day after

admission the patient was delivered of a stillborn child. The temperature rose to between 100° and 102° F. Diplopia was noticed on the following day. She had delusions, restlessness, and as she became worse she was transferred to another hospital. A diagnosis of myoclonic lethargica encephalitis was made. The patient was slowly recovering—four months later—but complete recovery was not expected.

Dr. J. CHISHOLM (Sheffield) recalled a case in a 2-para, with marked clonic movements of the abdominal walls and symptoms of internal obstruction. Caesarean section was performed; no obstruction was found and the movements continued afterwards. The patient was dull and apathetic. She recovered, but the child also had lethargic encephalitis. Dr. Chisholm mentioned another case with five and a half months pregnancy diagnosed at first as pernicious vomiting. Though labour was induced, the patient died. She had nystagmus in addition to the other symptoms.

Supravaginal Hysterectomy and Panhysterectomy.

Dr. FLETCHER SHAW (Manchester) read a paper on the advantages and disadvantages of supravaginal hysterectomy and panhysterectomy. He said that some gynaecologists believed that panhysterectomy should be done whenever the uterus had to be removed, while others believed that supravaginal hysterectomy was the better operation for many cases, though they would probably always do panhysterectomy if the cervix was badly lacerated. In a period of eighteen months he had had three patients in whom carcinoma of the cervix occurred after supravaginal hysterectomy, and his object in bringing the subject before the society was to see if other gynaecologists had had any similar cases. Although those three cases were seen in a period of eighteen months, they were the only ones he had ever had, and, so far as he knew, none of his colleagues at St. Mary's Hospital had had a single case; the occurrence after supravaginal hysterectomy was therefore very rare and it was probably merely a coincidence that he should get these three in so short a period. If that proved to be the case he still thought that there was a distinct use for supravaginal hysterectomy, as it was a much quicker operation and caused less shock to the patient and, moreover, did not entail opening the vagina, which, no matter how carefully cleaned, was potentially a septic passage. In a consecutive series of cases of supravaginal hysterectomy and panhysterectomy he found the mortality higher after panhysterectomy, and in the investigation of the convalescence of a consecutive series of both types the patients after supravaginal hysterectomy had, on the whole, a smoother time than those in whom the complete operation had been done. He still thought supravaginal hysterectomy was useful in nulliparous women, but panhysterectomy should always be done where the cervix was badly lacerated or in any way diseased.

The PRESIDENT said that he did not remember seeing carcinoma of the cervix after subtotal hysterectomy, but he had removed cervices for discharge. He believed that panhysterectomy was the better operation in all cases.

Cases and Specimens.

Dr. W. W. KING (Sheffield) showed a specimen of carcinoma of the cervix which he had removed. The patient had had subtotal hysterectomy in 1919 for fibroids. In 1923 she had bleeding for three months, and the cervix was found to be carcinomatous. He recalled another case in a nullipara who in 1911 had gonorrhoea. In 1918 the patient had a pelvic abscess drained; in 1920 she had subtotal hysterectomy for bleeding, and six to eight months later she had ineradicable carcinoma of the cervix. He believed in total hysterectomy in multiparae, and subtotal in nulliparae.

Dr. BRIDE said that in a case of a nullipara he had done a panhysterectomy and found an early carcinoma of the cervix. Dr. CHISHOLM mentioned a patient who had had a subtotal hysterectomy twenty-five years ago and who had bleeding for two months and was found to have ineradicable carcinoma. She had had one child and one miscarriage. Dr. CLIFFORD said that he did not remember a case of carcinoma of the cervix occurring in his practice after subtotal hysterectomy. He said that it was so rare that it hardly affected the difference in the mortality rate between the operations of subtotal hysterectomy and panhysterectomy.

Dr. J. BRIDE showed a tumour simulating complete ulcerated prolapsus uteri. He removed it from a 2-para who was pregnant four months. It was situated in the interval between the right labium majus and minus, and resembled an ulcerated complete prolapse. It had been noticed for twelve months and was steadily getting bigger. It was removed without affecting the pregnancy. Microscopically it was a fibroma.

Professor M. H. PHILLIPS showed (1) an adenomyoma of a rudimentary uterine cornu, and (2) salpingo-caecal fistula.

(1) The specimen was removed from a 7-para aged 44, who had had menstrual pain for the last seven years and recently pain not associated with menstruation. A swelling the size of a golf ball was attached to the left side of the supravaginal cervix and was diagnosed as adenomyoma of Gaertner's duct. At operation the swelling was found to be a rudimentary left cornu of the uterus attached to the supravaginal cervix, and also to the pelvic wall. On section of the cornu it was found to contain spaces filled with dark blood, lined by columnar or cubical epithelium, embedded in a cytogenous mantle similar to uterine endometrium.

(2) The specimen was removed from a 3-para, aged 32 years. Last child was born three years ago, and this was followed by severe abdominal pain for two weeks. She was admitted into hospital in November, 1922, suffering from a subacute attack of bilateral salpingo-oöphoritis. Five weeks later she was seen again, when she had a fixed tender swelling to the right of the uterus which was thought to contain pus. Four weeks afterwards the swelling had disappeared and the patient felt much better. She was admitted in August, 1923, for dysmenorrhoea and backache. On examination a retroverted adherent uterus and slight enlargement of the appendages were found. The right tube was firmly fixed to the caecum, and the thickened area of the caecum was removed with the tube. The end of the tube was found prolapsed into the cavity of the caecum, the ostium being patent and well away from the opening of the vermiform appendix. The condition was thought to be the result of rupture of the peritubal pyocele into the caecum.

Dr. BRIDE recalled a similar case in which an ectopic pregnancy had ruptured into the caecum. Professor M. H. PHILLIPS said that originally this case had been diagnosed as an ectopic pregnancy by the house-surgeon, but it had not occurred to him.

Dr. J. BRIDE gave the history of two consecutive pregnancies with central placenta praevia and Caesarean section.

A 2-para aged 34 was seen on November 20th, 1922, when she was found to be three months pregnant; she had a history of Caesarean section by Dr. Fothergill, whom he had assisted. A living child was delivered, who was still alive and healthy. On April 21st, 1923, the patient was admitted into hospital eight and a half months pregnant, with severe bleeding with central placenta praevia. Dr. Bride decided to perform Caesarean section; a living child was delivered, and at the same time the woman was sterilized by removing portions of both Fallopian tubes. The child died of convulsions on the eleventh day. Nothing was found to account for the placenta praevia habit.

Dr. STACEY said that it was very rare to have recurring central placenta praevia. Dr. W. W. KING asked to what extent the cervix was dilated; he criticized the second Caesarean section, and also the sterilization of the patient. Dr. FLETCHER SHAW said that one did not expect a Caesarean scar to stand difficult deliveries in future pregnancies. Dr. BRIDE said that the cervix was only slightly dilated; he did not consider possible rupture of the old scar. At operation the old scar could hardly be seen.

Dr. CLIFFORD (Manchester) related a case of full-time ectopic gestation.

A married woman was admitted to hospital on November 30th, 1922; she had had amenorrhoea since February, 1922. Foetal movement had shown that the child was active until two days before admission. She appeared to be at full term, the foetal limbs were rather prominent, the head high up and in the R.O.P. position. No foetal heart sounds were heard, nor any movement felt. The cervix was protruding from the vagina; the presenting part could not be definitely felt. A radiogram gave no assistance; the temperature was slightly raised; the cervix was cleansed and replaced and supported by a ring pessary. Labour did not come on and the patient was discharged at her own request on January 5th, 1923. She was readmitted on January 26th when the foetus was in the same position, and the temperature was slightly higher. Bougies were inserted into the cervix, but could only be pushed for 3½ inches. This was done twice. Her temperature was 102° F. and pulse rate 120. On January 29th and February 4th the patient had 4 minim doses of Dr. Jenkins's stock

residual vaccine. On February 14th Dr. Clifford opened the abdomen and found a full-term macerated foetus lying in a sac with the placenta almost entirely attached to the outer abdominal wall. This was stripped off without bleeding; the membranes were not removed, and the cavity was drained and irrigated by the Carrel-Dakin method for three weeks.

The cavity rapidly became smaller, and six weeks after operation there was a sinus 1½ inches long. Inquiries afterwards revealed the fact that in March, 1922, the patient had severe abdominal pain with vomiting, followed a little later by haemorrhage lasting five days. Afterwards she suffered considerable abdominal pain, and in May consulted a surgeon, who thought she had had appendicitis. Dr. Clifford considered that the condition was very difficult to diagnose.

LIVERPOOL MEDICAL INSTITUTION.

A MEETING of the Liverpool Medical Institution was held on November 15th, with the President, Dr. J. HILL ABRAM, in the chair, when Dr. HENRY COHEN read a paper on the value of hypertonic and hypotonic saline solutions in cerebral conditions.

After a brief summary of the experimental evidence on which this therapeutic method was based, Dr. Cohen recorded ten cases, six of cerebral tumour and four of post-operative cerebral hernia, in which marked alleviation of symptoms followed intravenous injection of 20 c.cm. of 30 per cent. sodium chloride solution. He commented on the oral administration of salt in these conditions, and on the use of hypertonic salines in the meningismus of acute infections, prior to cerebral operations, in the diagnosis of extracranial from intracranial causes of headache, and in the prevention of foraminal crowding following lumbar puncture in cases of cerebral tumour. The value of hypotonic salines in post-puncture headache was also recorded. A discussion followed, and in replying to it Dr. Cohen pointed out that a considerable amount of experimental work had yet to be done, and suggested that ophthalmic surgeons should try these hypertonic salines in cases of increasing intraocular tension.

Renal Sarcoma.

Mr. W. A. THOMPSON read a note on sarcoma of the kidney in an infant.

The patient was a female child, 15 months old, who was anaemic, emaciated, and had a large semi-solid swelling in the left lower abdomen. This swelling had been noticed for six months. It was moderately smooth in outline, there was no notch, there was dullness and bulging in the loin with colon resonance in front. The urine was normal and had apparently always been so. A renal sarcoma was diagnosed and operation advised. The operation was carried out through an incision to the outer side of the left rectus. The peritoneum on the outer side of the descending colon was incised and its edges brought up to the skin incision, and the operation was completed retroperitoneally. The child left hospital ten days later in excellent health.

Renal sarcoma appeared mainly during the first seven years of life; both sexes were affected with equal frequency, and the right side as often as the left. Occasionally it was bilateral. The clinical features in all cases were few and uniform—namely, a progressive, painless swelling in the lower abdomen, soon associated with increasing constipation and ultimately accompanied by emaciation. The sarcoma was thought to arise from the intrarenal adenomatous tissue which should have formed the convoluted tubules, but which, because of a poor blood supply, failed to develop normally and have taken on a tubulo-acinar formation. This became sarcomatous, and the growth, obliterating the calyces and renal pelvis, prevented secretion from the affected organ and thus explained the absence of haematuria, which was a common feature in these cases. The operative mortality was high, and of the late cases the majority of those who survived operation rarely lived twelve months. This patient made excellent progress for almost four months, when she contracted measles and died.

Idiopathic Hypertrophy of the Bladder.

Dr. A. DINGWALL FORDYCE and Dr. NORMAN CAPON read a paper on idiopathic hypertrophy of the bladder. Two cases of this condition were described, and lantern slides of the pathological condition exhibited. The analogy with other apparently idiopathic neuro-muscular conditions was dwelt upon, and reference was made to the literature of the subject. At *post-mortem* examination of the condition the only pathological findings were hypertrophy and dilatation of the bladder, dilatation of the ureters and of the pelves of the kidneys, and cystic-like degeneration of the kidneys. There was no detectable cause producing the obstruction. The inference, corroborated by analogy, was that vesical spasm produced the local sequelae, and that it in turn was secondary sometimes to obvious nervous lesions, and sometimes to nervous abnormalities, which were not detected.

Mr. R. E. KELLY pointed out that the *post-mortem* picture of dilated bladder, dilated ureters, and dilated renal pelves showed a remarkable similarity to the condition found in adults with an enlarged prostate or a urethral stricture. The disease was limited to the male sex, and, therefore, the explanation that it was due to some neuropathic cause was a difficult explanation to accept. In his opinion there was obstruction. This obstruction was due to the constant and repeated blockings of the urethra by plugs of mucus. One had only to witness the pain, tenesmus, and straining in the living subject, followed not by a complete emptying of the bladder, but the passage of a small plug of mucus, to appreciate the enormous strain on the bladder. The increased tension inside the bladder produced the disease. It was a further example of the value of living pathology over observations made in the *post-mortem* room. In one case he had to withdraw a catheter two or three times and remove a plug of mucus from the eye of the catheter before he was able to empty the bladder completely. For this reason it was found impossible to wash out the bladder per urethram, for even after repeated washings under an anaesthetic mucus could still be detected by the cystoscope. In his opinion suprapubic cystotomy was the best treatment.

ROYAL ACADEMY OF MEDICINE IN IRELAND.

A MEETING of the Section of Pathology of the Royal Academy of Medicine in Ireland was held on November 2nd, with the President, Dr. JOSEPH T. WIGHAM, in the chair, when Dr. A. R. PARSONS described a case of early Hanot's disease in a woman aged 31; *post-mortem* examination showed great enlargement of the spleen and thymus, congestion of the pancreas, and cirrhosis of the liver. Dr. GEOFFREY HARVEY described a case of splenic atrophy with thrombosis of the splenic artery in a woman aged 51; a large pleural effusion on the left side gave rise to the surmise that it was a case of early cancer of the lung or pleura, but no thoracic tumour was found at necropsy. Dr. H. C. C. DEANE described a case of tubal pregnancy; on *post-mortem* examination of the specimen the tube wall, in some of the sections, was seen to be infiltrated by the foetal cells, and small syncytial masses were found lying between the muscle fibres of the wall; it was uncertain whether to regard the condition as a simple tubal pregnancy or one tending to become a chorion-epithelioma. Dr. T. O. GRAHAM described an extensive case of intrathoracic sarcoma; at necropsy the growth was found to extend to the glands of the right side of the neck and to part of the pericardium, while the glands behind the stomach and pancreas were also affected. Dr. W. D. O'KELLY demonstrated a new method of making museum jars from celluloid.

AT a meeting of the Section of Surgery of the Royal Academy of Medicine in Ireland, held on November 16th, the President, Sir WILLIAM DE COURCY WHEELER, drew attention to the frequent coincidence of several cases illustrating rare conditions of the same organs being admitted to hospital about the same time. For example, within two years he operated upon three cases of abdominal aneurysm, but had never done so before or since. Four cases of fractured femur, with unusual complications leading to amputation, were recently seen. In September he had performed Leriche's operation of sympathectomy three times; and three cases of rare varieties of malignant tumour of the kidney had been seen during the past year. Mr. C. J. MACAULEY read a paper on traumatic rupture of the liver and of the spleen, describing an interesting case of each; in the second case the spleen was completely torn off and temporary clotting of the blood vessels had saved the patient's life.

Reviews.

PSYCHOTHERAPY.

IN *A Manual of Psychotherapy*[1] Dr. HENRY YELLOWLEES sets forth first the principles upon which modern psychotherapy is founded, then its methods and their application, and finally the field in which these methods may be used. In the main the author follows the teaching of Freud, and he expresses the view that there is really no broad and comprehensive theory of the neuroses, and certainly no intelligible pathology of the neuroses, save on the foundations which psycho-analysis has laid. While he feels, however, that intelligent psychotherapy is wellnigh impossible without a knowledge of the postulates and principles of psycho-analysis, he is by no means of the opinion that exploration of the unconscious mind by the Freudian method is the only psychotherapeutic remedy of curative value.

Throughout his book Dr. Yellowlees shows that the general practitioner has a wide field of usefulness in dealing with his nervous cases by means of persuasion, suggestion, re-education, and simple analysis, and in his last chapter, where he gives some illustrations of the application of psychotherapeutic methods to actual cases, he maintains that the majority of these could and should have been treated by the general practitioner. The point is an important one, because there would seem to be little purpose in insisting upon the student receiving special training in the treatment of the psychoneuroses if such cases could only be beneficially treated by specialists and by complex procedures involving treatment for one or more years. Naturally many nervous cases require prolonged and expert treatment, but, as the author shows, many conditions arising in an average practice respond to measures of a relatively simple kind.

We can recommend this book as a useful introduction to psychotherapy. It is clear and readable and the author maintains throughout a commendable breadth of view.

OPHTHALMOLOGY.

IT is said by the more indolent kind of reviewer that it is sometimes possible to review a book from the preface, but certainly this would not be possible in the case of the encyclopaedic *Traité d'ophtalmologie*,[2] by Professor POULARD of Paris, for the preface consists of only ten lines. The author states that his book is largely the result of his own personal observations—it is not a reproduction of the works of others; flagrant errors have been rejected, matters of historical interest have been intentionally omitted, fantastic theories have been accorded their proper place, and hypotheses have not been presented as facts. The hope is expressed that the perusal of this book will stimulate the younger ophthalmologists to think for themselves and teach them not to be ashamed of holding their own opinions; in fact the preface suggests a more tolerant attitude towards the free opinions of the younger men than is sometimes to be met with among their more senior colleagues.

In its general arrangement the book conforms to the usual type. The first volume contains chapters on surgical technique, ophthalmoscopic examination, diseases of the conjunctiva, the cornea, the sclerotic, the iris and ciliary body, wounds of the globe and orbital trauma, the artificial eye, the eyebrow, the lids, the lacrymal apparatus, and diseases of the orbit. The second volume deals with refraction, affections of the lens, vitreous, choroid, retina, the optic nerve, the ocular muscles, and ophthalmological neurology. The index occupies fifteen pages and seems hardly commensurate with the size of the book. The work is essentially clinical in type, little space being devoted to anatomy and physiology, and not very much to pathology, more particularly the histological portions of that part of the subject, but the large number of illustrations and diagrams to a certain extent minimizes any drawback arising from insufficiency of printed description on these points.

The three coloured plates deal with the plastic repair of the lids by turning in flaps of skin from the neighbourhood; there are no coloured plates of the fundus oculi. Figure 69 is labelled follicular conjunctivitis, but it looks much more like spring catarrh.

Conjunctivitis is conveniently classified as follows: contagious with secretion, superficial; contagious without secretion, interstitial; eruptive, non-contagious, and conjunctivitis following customary types—this chapter is particularly good; noteworthy also is the large amount of space devoted to syphilis of the membrane, a subject that is often treated rather superficially in the textbooks.

In the section on glaucoma the numerous newer operations for its relief are described and two excellent pictures of Herbert's small flap sclerotomy are given; in dealing with the trephine operation of Colonel Elliot the pictures are hardly so good—the conjunctival flap is drawn much too triangularly, and the trephine appears to have been placed purely on the sclerotic; it is only fair to state that in the description of the operation the necessity of dissecting a little way into the cornea after the conjunctival flap has been dissected down to the limbus is duly insisted on; the instrument illustrated seems to be the one devised by Stephenson, and not that of Elliot.

We have said enough to show that the book is a very good one; it is well printed and has an extraordinary wealth of illustrations. We have no hesitation in saying that we expect it to take its place as one of the standard textbooks on ophthalmology in the French tongue.

The appearance of the third edition of Meller's *Ophthalmic Surgery*,[3] edited by Dr. WILLIAM SWEET, is very welcome. This, the abbreviated title, is a little misleading, for the book does not make any pretence to go over the whole ground of ophthalmic surgery, but, as the title-page explains, is a description of operative measures recommended and performed in the great eye clinic of Vienna. Those who have ever taken out a post-graduate course in this world-famous clinic will be glad to have the methods which they learnt there kept fresh in their memory, and those who have not enjoyed the same advantages will be glad to read the descriptions of the operation which are usually performed at this clinic. We may say at once that the measures described in this book are all of them sound in theory; the degree of success attained depends upon the individual surgeon, and the results very often on the docility and behaviour of the patient. It is interesting to see how large a place local anaesthesia takes in ophthalmic surgery in Vienna; there seems to be little that cannot be done under a local anaesthetic, even Krönlein's operation. Meller rightly insists on a thorough knowledge of general surgical principles in anyone who contemplates taking up the study of ophthalmic surgery, and observes that attendance at operations as assistant helps the beginner materially. The instruction given comprises the correct demonstration of the proper method, and the analysis of accidents and mistakes. We are glad to see that throughout the book due recognition is given to this last matter.

The rest of the work is thoroughly sound, though some of the descriptions will hardly commend themselves to surgeons in this country; such, for instance, as the use of the keratome for making the section in iridectomy for glaucoma, and the advice given on page 205 that when the knife has been introduced for the section in cataract cases with the cutting edge downwards, if recognized immediately after the point of the knife enters the anterior chamber, the counter-puncture should be completed and the blade of the knife rotated as quickly as possible 180 degrees in its long axis, so that its edge becomes directed upwards. Meller states that the quick rotation prevents the escape of the aqueous, and that turning the knife in the wound is without disturbing consequences; we confess that we have never tried this manœuvre and we should be sorry to have to undertake it.

The book is well printed and the illustrations are very

[1] *A Manual of Psychotherapy for Practitioners and Students.* By Henry Yellowlees, O.B.E., M.D., F.R.F.P.S.G., M.R.C.P.Edin., D.P.M.Lond. London: A. and C. Black, Ltd. 1923. (Cr. 8vo, pp. xv+247. 10s. 6d. net.)

[2] *Traité d'ophtalmologie.* Par A. Poulard. Tome I et Tome II. Paris: Masson et Cie. 1923. (Roy. 8vo; Tome I, pp. 753, 402 figures, 3 plates; Tome II, pp. 699, 308 figures. Fr. 120 the two volumes.)

[3] *Ophthalmic Surgery.* A Handbook of the Surgical Operations on the Eyeball and its Appendages as practised at the I. Eye Clinic, University of Vienna. By Dr. Josef Meller; edited by Dr. William Sweet. Third edition, translated from the second edition, "Augenärztliche Eingriffe." London: William Heinemann. 1923. (Med. 8vo, pp. xv + 365; 225 figures. 25s. net.)

good; the translator might have taken more pains to make his English easy reading; without being over-fastidious about split infinitives, a protest against the large number in this volume may be permitted.

One of the most useful of the smaller monographs on his subject to the ophthalmic surgeon is the handbook on *Perimetry* by Dr. LUTHER C. PETER, and we welcome the appearance of the second edition.[4] The text has been recast to a certain extent; for instance, the section on the anatomy and physiology of the visual pathway has been transposed from Section III to the opening chapter; this is an improvement, for it is essential for the student to get a good grip of the anatomy and physiology of the subject before he enters on the study of the diseases. The new edition contains about fifty more pages and roughly forty more illustrations than its predecessor. For those who do not already know the book we may say that it is arranged under the following sections: anatomy and physiology; physiological principles and normal fields; methods, instruments, charts, and technique of field taking; general pathology of the visual field; special pathology of fields; fields in functional nervous diseases; and an appendix. The contents are thoroughly up to date, and it is pleasing to find proper recognition is accorded to the work of Gordon Holmes, Sir William Lister, Traquair, and Sinclair, in advancing knowledge of the cortical representation of the macula and in quantitative perimetry. An extensive bibliography completes a book which is singularly well produced; the paper and print are very good; there is a wealth of illustrations. It should find a place in the library of every ophthalmic surgeon.

WOMANHOOD AND HEALTH.

DR. CHRISTINE MURRELL has compressed into her little book, *Womanhood and Health*,[5] an enormous amount of information. The five chapters deal with reproduction from the biological standpoint, the organs of reproduction and their functions, menstruation, the laws of health specially applying to women, and suggestions to parents and teachers as to the methods of instruction for the young. The book is based on lectures given to many audiences during the last twenty years; and this no doubt accounts for the sense of compression induced in the reader. Dr. Murrell's aim is to give women sufficient information with which to test for themselves the various forms of advice they will inevitably be given, and to separate the wheat from the chaff. She is concerned also to show that the average woman is a normal, healthy individual, and that the mid-Victorian idea of semi-invalidism as the usual lot of women should be discarded. This thesis is developed chiefly in the chapter on menstruation, in which the investigations of several women doctors are quoted to show that the human organism works in a cycle of three to four weeks, and that the cycle is common to both sexes and bears no necessary relation to the menstrual period. Rather is it suggested that the change in emotional tone is due to alteration in blood pressure and not to the onset of menstruation. Some authorities, however, appear to admit that "owing to the probable emotional instability there is a natural tendency to 'feel sorry for oneself'" at the menstrual period, "and that this should be combated." The conclusion is drawn that menstruation should be regarded in the same light as the other recurring functions of the body, such as sleep, the taking of food, or the daily action of the bowels, all of which are not considered to imply any indisposition or departure from normal health. "It is of the first importance that women should recognize that they, no less than men, are normal healthy individuals," and "that the emotional cycle is a joint inheritance which they share with men, and is no true gauge of mental efficiency." The recognition of the truth of these propositions is regarded as important because in these days so many women have to compete for work in the open market, and menstrual disability would prove an insuperable obstacle to their success. Dr. Florence Meredith of New York is quoted as reporting that dysmenorrhoea has decreased enormously in recent years, and the decrease is attributed to (1) improved attitude of mind, (2) increased general activity with no remission during the period. How small the effect of menstruation need be on the general activities is shown by the fact that the majority of women find that they can continue to take baths during the period without any ill effect and with much additional comfort.

Notwithstanding these views Dr. Murrell seems at times to be stricken with the thought that things are not quite so simple with women as with men, as when she states that the gradual cessation of the powerful ovarian hormone at the climacteric "tends to produce a temporary emotional instability of depresssion. This depression is much diminished if its cause is understood, and at its worst it need only be regarded as a dark tunnel through which the woman must pass in order to emerge into the calm daylight of peaceful later years."

Dr. Murrell gives much sound advice on the laws of health applying to women, though the modern scientific prohibitionist may object to her statement that "alcohol is a stimulant, and should only be taken as such." In the chapter on instruction for the young a difficult subject is tactfully dealt with.

COLITIS.

Les Colites[6] contains the collected instruction given in a course of lectures at the Beaujon Hospital, Paris, under the direction of Professor PAUL CARNOT, who has written an interesting introduction and himself describes amoebic and other parasitic forms of colitis. He argues that, contrary to some suggestions, the colon has distinct uses, the right or proximal segment being responsible for absorption and the left or distal portion for the accumulation of faeces, and that from a pathological point of view there may be right-sided or left-sided diarrhoea or constipation; in stasis of the contents in the left colon (Hurst's dyschesia) there is a remarkable freedom from symptoms, in contrast to the definite manifestations associated with right-sided stasis. In describing Bauhin's valve at the junction of the small and large intestines, Professor Carnot refers to the muscular sphincter described in 1902 by an anatomist of the name of Elliot Keith, thus recalling two distinguished members of the British school.

The specific infective and toxic forms of colitis, including typhoid, paratyphoid, bacillary dysentery, uraemic and mercurial colitis, are summarized by Dr. P. HARVIER, who remarks that, whereas an anti-Shiga serum is effective, no benefit can be expected from an anti-Flexner serum. In this writer's account of the various forms grouped together as cryptogenic, the condition commonly though inaccurately known as mucous colitis is described under the cumbrous if more correct name of muco-membranous colopathy, and among the numerous causes mentioned importance is attached to lesions of the female sexual organs. The treatment is discussed under the three heads of the syndrome, the etiological factors, and the painful crisis; for the constipation, which with the mucous casts and the pain constitutes the three cardinal manifestations, irritating purgatives and laxatives are held to be contraindicated and the use of enemas rarely desirable, though the Plombières treatment is approved. Recto-sigmoiditis is considered by Dr. FRIEDEL, and the surgical complications of colitis, which as compared with appendicitis rarely attract attention, are detailed by Dr. G. LARDENNOIS; they include—first, acute lesions, such as severe haemorrhage which may be successfully treated by timely caecostomy, and suppurative perisigmoiditis; and secondly, chronic conditions such as constipation (in connexion with which Sir Arbuthnot Lane's total colectomy is critically considered), pericolitis, and megacolon.

This concise handbook may be recommended as a clear and useful guide on this subject.

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[4] *The Principles and Practice of Perimetry.* By Luther C. Peter, A.M., M.D., F.A.C.S. Second edition, thoroughly revised. Philadelphia and New York: Lea and Febiger. 1923. (Med. 8vo, pp. xii + 281; 160 figures, 4 plates. 4 dollars.)

[5] *Womanhood and Health.* By Christine M. Murrell, M.D., B.S.Lond. London: Mills and Boon, Ltd. 1923. (Cr. 8vo, pp. 154; 15 diagrams; charts. 5s. net.)

[6] *Les Colites.* Par P. Carnot, P. Harvier, R. Friedel et G. Lardennois. Paris: J. B. Baillière et Fils. 1923. (Demy 8vo, pp. 224; 34 figures. Fr. 10.)

ON SUICIDE.

IN his pamphlet on suicide,[7] which forms one of the supplements issued from time to time by the *Monatsschrift für Psychiatrie und Neurologie*, Dr. R. WEICHBRODT, who is attached to the Frankfort University Clinic for Psychiatry and Nervous Diseases, has collected statistics showing that there has apparently been a great increase in the number of suicides since statistical inquiries on this subject were first instituted nearly a hundred years ago. During the period 1870-1900 the number of suicides in Austria rose from 1,560 to 4,215, in Italy from 836 to 2,040, in France from 4,490 to 8,926, in England from 1,495 to 2,896, in Switzerland from 321 to 746, in Belgium from 367 to 786, in Denmark from 505 to 550, and in Spain from 112 to 118. Norway was the only country which showed a slight decrease—namely, from 128 to 117. The difference in the tendency to suicide of the various races is shown by calculating the relation of the number of suicides to the population. Thus to every million inhabitants in Denmark there were 224 suicides, in Switzerland 225, in France 222, in Germany 207, in Russia 31, and in Spain only 21. The author believes that economical causes are chiefly responsible for the apparent increased frequency of suicide. Formerly suicides were much more frequent among men than among women, the proportion of male to female in the nineteenth century being four to one. In the last thirteen years before the war, while the number of suicides among men increased by only 20 per cent., the increase among women was 70 per cent., corresponding, as he asserts, to the increase in the number of women who had taken up some profession or trade. During the war decrease in the number of suicides among men was accompanied by a steady increase among women, so that by 1918 there were 63.4 suicides among women to every 100 suicides among men.

As regards the influence of climate on the frequency of suicide, Montesquieu's statement that more persons kill themselves in the winter than in the summer is held to be disproved by statistics, which show that the number of suicides increases in the spring, reaches its acme in May and June, and sinks to its lowest level in December and January.

In discussing the relation of suicide to insanity, Dr. Weichbrodt remarks that though a certain number of suicides are of unsound mind, a study of the literature and his own observations have convinced him that the estimate of one-third is much too high, as in a large number of suicides it has not been possible to find any psychical abnormalities. In conclusion, he maintains that the best prophylaxis of suicide consists in a sound ethical education at home and at school, and that the frequency of suicide among the mentally unstable can be reduced by early psychiatric treatment.

BACTERIOLOGY.

A Manual of Determinative Bacteriology[8] has been edited by a Committee of American Bacteriologists under the chairmanship of Dr. DAVID BERGEY of Pennsylvania. Its object is to provide a key to the classification of organisms belonging to the schizomycetes. Though it is based principally on the work of the Society of American Bacteriologists published in 1917 and 1920, there are a considerable number of modifications of the scheme proposed by them, as well as the introduction of many new genera, which are put forward—we hope, at least—more in a tentative manner than with any purpose of finality. Thus, for instance, the tribe Bacteriae, comprising the coli-typhoid organisms, is subdivided into six genera—the Escherichia, Aerobacter, Proteus, Salmonella, Eberthella, and Alcaligenes. The familiar *B. coli* is now termed *Escherichia coli*, and *B. typhosus Eberthella typhi*. These subdivisions have much to recommend them, but we doubt whether all of them have been sufficiently carefully thought out; whether, for example, it is wise to place lactose-fermenting, indol-producing organisms in the same genus as that to which the *B. typhosus* belongs. Further evidence of this confusion is seen in assigning *B. muriseptic*us—the causative organism of swine erysipelas—to the genus Pasteurella, from which it is clearly separated by morphological, cultural, fermentative, serological, and pathogenic characteristics. In spite of its numerous shortcomings, however, which are inevitable in such a subject as this, the book has much to recommend it, and any criticisms we have put forward are intended more in a constructive than in a destructive sense. There is no doubt that such a work is badly needed—not so much by those engaged in clinical bacteriology as by those who are commencing to study bacteriology as a pure and not as an applied science. Just as in botany one can with the aid of Hooker determine by examination of a flower the genus to which it belongs, so now is it possible with this manual to assign an unknown bacterium to its proper genus. We congratulate the authors on their attempts to solve an extremely difficult problem; their work will go far to lift bacteriological classification from the chaos in which it is at present and to place it on a sound footing.

The book *Bacteriology*,[9] "a study of micro-organisms and their relation to human welfare," appears to have had its origin from a conversation held early in 1916 between the two Drs. CONN, which led them to conclude that a work dealing with general bacteriology and its applications to all branches of science was wanted. The requirements of the medical student have been well attended to by medical bacteriologists, as is witnessed by the booksellers' lists, for there are big books and little books in great numbers. The small group of micro-organisms capable of causing human disease are undoubtedly of great importance, but they are, after all, a very small part of that vast number of microscopic creatures without whose assistance animal life on this planet would be impossible. Human welfare depends on the benefit we derive from this larger group just as truly as human disease on the menace of the smaller pathogenic group. The book has not been written specially for medical students, but it contains seven chapters on pathogenic organisms; a detailed description of individual bacteria is not given, and the subject is dealt with in an elementary and general fashion. A much larger part of the book is devoted to such subjects as micro-organisms in relation to the fertility of the soil, the part played by bacteria in the dairy industry, bacteria in relation to plant diseases, and the functions of micro-organisms in the manufacture of alcoholic beverages, bread-making, the manufacture of vinegar, and the treatment of fodder. Thus a very wide field is covered. The descriptions are clear and concise and eminently readable. When the authors descend from the general to the particular their detail is not always accurate, as for instance, the remark on page 134, "There is considerable evidence that long-chain-forming streptococci in milk are pathogenic forms." The majority of the illustrations of bacteria have little value and many will be apt to give an erroneous impression to readers who have never looked down a microscope. It is a pity also that the authors cannot make up their minds whether to employ the Fahrenheit or centigrade temperature scale; in some places they use one, elsewhere the other. These, however, are criticisms of detail, and one need not be too punctilious about detail in a book the main object of which is to present a broad and general survey of the activities of bacteria in nature and industry.

PLANT BIOLOGY.

MR. TANSLEY tells us in the preface to his book *Elements of Plant Biology*[10] that it is primarily intended for students, medical and other, who must obtain some knowledge of plants in relation to general biology and who have little or no groundwork upon which to build. It may be said at

[7] *Der Selbstmord.* By Privatdozent Dr. med. R. Weichbrodt. Berlin: S. Karger. 1923. (Roy. 8vo, pp. 44.)

[8] *Bergey's Manual of Determinative Bacteriology.* Baltimore: Williams and Wilkins Co. 1923. (Med. 8vo, pp. xii+442. 5.75 dols.)

[9] *Bacteriology: A Study of Micro-organisms and their Relation to Human Welfare.* By H. W. Conn, Ph.D., and H. J. Conn, Ph.D. Baltimore: Williams and Wilkins Co. 1923. (Med. 8vo, pp. 441; 6 figures. 4 dols. in U.S., Canada, Mexico, and Cuba; 4.50 dols. other countries.)

[10] *Elements of Plant Biology.* By A. J. Tansley, M.A., F.R.S., University Lecturer in Botany and Examiner in Elementary Biology to the University of Cambridge. London: George Allen and Unwin, Ltd. 1923. (Cr. 8vo, pp. 410. 10s. 6d. net.)

once that the book admirably fulfils its purpose, and that it may be read by others with both interest and profit. The author's style is so clear and easy that even the beginner can easily understand the many technical words so terrifying to the uninitiated, the derivations of the scientific terms being given as footnotes. At the end of each chapter instructions for practical work are set forth, making the book useful to teacher and student alike.

Written from the physiological standpoint, only such anatomical details are given as are necessary to understand the functions concerned. This is as it should be. The student is but too often overloaded with a mass of purely anatomical detail, resulting first in boredom and ending ultimately in aversion, because the bearing of such details upon their ultimate studies is not only difficult to comprehend, but also very frequently as difficult to justify.

More and more are biological processes finding their applications in clinical medicine. A book such as Mr. Tansley's, by stimulating general interest, makes such applications easier to imagine. The earlier chapters give a lucid account of the elementary facts of biochemistry. In other parts the curtain is lifted sufficiently to give to the intelligent beginner a glimpse of the philosophical problems with which the science of biology teems. For example, the origin and evolution of the soma and of sex are described in a series of organisms commencing with *Chlamydomonas* and terminating with *Volvox*. This is followed by an account of the nature and significance of the differentiation of the male and female gametes.

Sufficient has been written to indicate the general scope of the book. It is obviously the work of an author having the somewhat rare ability of combining scientific knowledge with simplicity of exposition, and of looking at his subject from the points of view of both teacher and student.

NOTES ON BOOKS.

Life Movements in Plants, by Sir J. C. BOSE, has been issued in three parts, and we are here concerned with the third and fourth.[11] The movements of plant organs under the changing forces of the environment are mostly the effects of variation of temperature, of the stimuli of contact, of gravity, and of light. The reactions are identical, whatever the nature of the stimulus, but vary with its intensity, and with the physiological condition of the tissue. In the normal state the response is by contraction, in the flaccid or subtonic condition by expansion or turgescence—a species of erection leading to reversal of the direction of movement. With a feeble stimulus an expansive reaction is induced, in contrast with the contractile effect of a moderate stimulus. In addition to actual movements, response to stimulation is evidenced, it is said, by change in the rate of growth and by electrical variation. Under a subminimal stimulus the response is electrically positive and the rate of growth is accelerated; a stimulus of moderate intensity induces, on the other hand, a negative electric variation and retardation of the rate of growth. It is stated that when a plant organ is subjected to a strong stimulus it exhibits a series of multiple responses. In the leaflets of Biophytum there is a long refractory period and the response is on the "all or none" principle. A single moderate stimulus gives rise to a single response, and a strong stimulus causes a series of responses. The book contains descriptions of numerous experiments; in one the leaf stalk of the nasturtium was seen when placed horizontally to begin to bend upwards in the course of a few minutes; the problem was to identify the particular group of cells whose activity induces this change, and the nature of the stimulus. Using an extremely fine pointed electrode, insulated except at the extreme tip, the author sought to ascertain the electrical condition of the leaf stalk at varying distances from its surface. With the stalk in a vertical position the galvanometer showed no reaction at whatever depth the electrode was inserted, but in the horizontal position a marked galvanometric response occurred in the layer of cells characterized by the presence of starch granules. The author correlates the development of the electro-negative condition with the displacement of the starch granules, as the vertical position was gradually changed to the horizontal. Other problems investigated were the existence of tissue-tracts analogous to nerves, the possibility of the transmission of excitations to a distance, and the effects of poisons and anaesthetics.

[11] *Life Movements in Plants*. By Sir Jagadis Chunder Bose, Kt., M.A., D.Sc., LL.D., F.R.S., C.S.I., C.I.E. Transactions Bose Institute: Vols. III and IV, 1920, 1921. London and Bombay: Longmans, Green and Co. 1923. (Demy 8vo, pp. xx + 902; 327 figures. 20s. net.)

Applied Psychology for Nurses,[12] by Dr. DONALD A. LAIRD, Assistant Professor of Psychology in the University of Wyoming, as an introduction to applied psychology is the best book which has come under our notice, and if each nurse were advised to read it before completing her training many nurses and patients would be the happier. The book is a successful attempt to select from the vast literature of psychology such facts as will be of most immediate aid to nurses in understanding their patients and themselves as organisms that act, think, and feel. It is divided into four parts and has an index. The first part is introductory; the second deals with the biological foundations of behaviour; the third considers the practical applications of the results of biological adaptations; and the fourth gives a brief account of mental hygiene especially with reference to the nation. All the parts are well written and clearly presented, with an occasional lightness that will refresh the reader. At the end of each chapter is a list of topics for discussion in the form of questions which test the reader's memory and mental agility.

Dr. LEONARD WILLIAMS has revised the text of his well known *Minor Maladies and their Treatment* for the fifth edition,[13] issued this autumn. The chapter on minor glandular insufficiencies has been practically rewritten, as was necessary owing to the great progress in endocrinology which has taken place in the last four or five years. The author insists on the necessity of bearing in mind the important fact of the interdependence of the glands which constitute the system. We have no doubt that the book in this new edition will continue to command the approval of the profession.

[12] *Applied Psychology for Nurses*. By Donald A. Laird. Philadelphia and London: J. B. Lippincott Company. 1923. (Demy 8vo, pp. ix + 235; 49 illustrations. 10s. 6d. net.)

[13] *Minor Maladies and their Treatment*. By Leonard Williams, M.D. Fifth edition. 1923. London: Baillière, Tindall, and Cox. (Crown 8vo, pp. xiii + 414. 7s. 6d. net.)

MEDICAL AND SURGICAL APPLIANCES.

A Gas-Fire Accessory.

MANY users of gas fires place a pan of water in front of the stove in the belief that the dryness of the air which results from the burning of gas and which may cause parching of the throat and irritation of the eyes is thereby diminished. The probability is, however, that any vapour which arises from the water so placed is sucked into the fire, and does not get into the atmosphere of the room at all. A patent automatic device called the "Oxynydor" has been placed upon the market by the Yorkshire Steel Company, Limited (30, Holborn, London, E.C.), wherein the open pan of water is replaced by a more scientific but not much more elaborate contrivance. It consists of a small glass cistern placed on a saucer at the side of the fire. Projecting from the saucer is a long bar of asbestos running horizontally in front of the fire. The cistern is filled with water, and within a few minutes of the lighting of the fire a small stream of vapour issues from a diffuser at the top of a vapour column parallel with the cistern. This vapour goes out into the room and moistens the air. The room can be perfumed in this way if desired, or a deodorizer can be used. We have seen the arrangement demonstrated, and it appears to do what is claimed for it. It is applicable to electric fires, and it may find a use in sick-rooms and even in hospitals as a means of doing away with almost the only disadvantage of gas or electric heating as compared with the open coal fire.

St. Dunstan's Clinical Thermometer.

The purchaser of a St. Dunstan's clinical thermometer will provide himself with two sources of satisfaction. In the first place he will contribute to the support of an admirable institution. One-half of the profits from the sale of the thermometer goes to the funds of St. Dunstan's. Secondly, he will possess an extremely ingenious instrument. This method for keeping a thermometer constantly in a sterilizing solution is the invention of Dr. A. McDonnell. The case consists of a double tube, the inner tube being made of glass and the outer of metal. The lower end of the glass tube is rendered watertight by means of an indiarubber plunger which is twisted and compressed by a screw. The upper end of the tube is closed by an enlargement of the upper end of the thermometer fitted with an indiarubber band. The glass tube is disconnected for filling, and inserted up to its middle in the disinfectant solution the possessor may prefer. A finger is placed over the exposed end, and the tube withdrawn half-filled with disinfectant. A small piece of rubber tube inside the glass case receives the bulb of the thermometer and prevents contact with the case. A small nut fixes the glass case to the metal tube. It is stated that the markings on the thermometer are permanent and will not be washed off by the disinfectant, whether carbolic acid 1 in 20 or mercury perchloride 1 in 1,000. The thermometer case is no thicker, and very little longer, than an ordinary case, and is supplied with a pocket clip. Messrs. J. J. Hicks are the makers of the instrument. The price is 6s. 6d.

Nova et Vetera.

THE FATE OF LAVOISIER.

ARE all the famous sayings to be discredited?

We are told that the French Guards at Fontenoy did not request the English to fire first, that Wellington did not cry "Up, Guards, and at 'em!" nor Cambronne "The Guard dies but does not surrender," at Waterloo. Recently several attempts have been made to prove that the famous saying to the effect that the French Republic had no need of savants was apocryphal.

A note published on October 20th (p. 727), in which we quoted from the author of the paper under notice a list of martyrs to science containing the name of Lavoisier, has brought us the following letter from Dr. Arthur Lynch:

"When an error either in history or in science is repeated often enough it obtains a sort of official consecration, but that is not quite the same thing as the truth. This is apropos of your notice of Mr. Harry Cooper's article, in which Lavoisier is included among the martyrs to science. That was not the case. The great chemist was executed as a 'profiteer.' He had married the daughter of a banker to whom public taxation had been farmed. The Revolutionists were very bitter against this class, and it was in spite of, and not because of, Lavoisier's achievements in science, that he was guillotined. What then becomes of the famous saying 'The Republic has no need of savants'? Nothing becomes of it, for it was never uttered. It was invented in a style the secret of which is still not lost by the Royalists, and used for propaganda."

We are disposed to agree that Lavoisier was executed along with the other farmers-general because he was a farmer-general. But we are not on that account compelled to accept Dr. Lynch's sweeping denial of the story that the infamous Coffinhal, vice-president of the Revolutionary Tribunal, dismissed the illustrious chemist's plea for a fortnight's respite with the words "The Republic has no need of savants or of chemists." There is very respectable and almost contemporary authority for it and indeed every probability that the reply was actually uttered.

The Farmers of the Revenue, of whom Lavoisier was one, were ordered by the Convention to produce their accounts. To do so fully was difficult or impossible because a great many of the necessary documents had been destroyed in the disturbances of the earlier days of the Revolution. In 1794 they were arrested but allowed access to their papers; they offered to pay 22 million livres, but in vain. Thirty-five of them were brought before the Tribunal and condemned to death. The only charge that was at all seriously examined was that of having watered the tobacco, of which they had the monopoly, and thereby—it is to be supposed—having aided the enemies of France. They had done nothing worthy of death, but they were "aristocrats" and rich and their estates were to be confiscated.

In Volume XIV of the *Procès fameux jugés avant et depuis la Révolution*, par le citoyen Desessarts, published in 1797 (only three years after Lavoisier's death), we have an almost contemporary account of the circumstances.

Vice-president Coffinhal, who was the judge, was one of Robespierre's adherents up to the very last, and of Robespierre we are told that it was notorious that he hated men of talent and still more men of genius, and that it was to this passion that Lavoisier owed his death. Marat also had a fierce grudge against Lavoisier as a man of science, as Michelet distinctly states.

"This great revolutionist," (in science) "Lavoisier, would not have been able to make his revolution, had he not been rich. It was for this purpose that he had desired to be a farmer of the public revenue. Far from assuming in this capacity a fiscal spirit, he advised the lowering of several imposts, maintaining that the revenue, far from diminishing, would increase. When appointed by Turgot director of the powder-magazines, he abolished the vexatory custom of searching the cellars in quest of saltpetre. Lavoisier, far more known than the other farmers of the revenue, had to undergo alone the whole of the too natural animosity of the people against that body, so fatal to the state. He had taken the principal part in a measure necessary for the salubrity of Paris, which then occupied the minds and excited the imaginations of men, the removal by night of the bodies that had been heaped together for so many ages in the cemetery of the Innocents. They also attributed to him, without any proof, the plan of the new wall with which the *Ferme-Générale* surrounded Paris. Marat reproaches him with having wanted with that wall, 'to deprive the city of air' and stifle it. . . . His (Marat's) persevering accusations, reiterated in several ways, prepare the scaffold for Lavoisier. The latter, who plainly perceives that having done so much, and so much to do, his life is of inestimable value to the world, never thinks of flying. He could never guess the fatal stupidity that could deprive science and mankind of so precious a life. And yet hatred, fomented by Marat, increases. He had been unable to annihilate Newton; so, to console himself, he is determined to destroy the Newton of chemistry."

According to Michelet, Marat held a theory of light which was to overthrow Newton's, but the French men of science easily disproved it. As Lavoisier was the most distinguished man of science in France, Marat had a spite against him. Michelet, of course, was an apologist for the revolution and anything but a Royalist. He does not refer to the saying, "The Republic has no need of savants!" But he is clearly of the opinion that Lavoisier was guillotined because Marat hated him *as a man of science*.[1] It may be objected that Marat was murdered ten months before the death of Lavoisier; but his influence survived him.

As soon as Lavoisier was ordered to be sent before the Revolutionary Tribunal, he foresaw the fate which awaited him and asked for a fortnight's respite. "I need this time," said he, "to complete some necessary experiments in some important work in which I have been engaged for several years. I do not cling to life, I will sacrifice it to my country." The brutal Coffinhal, says Desessarts, "this tiger of human aspect, made this barbarous answer to Lavoisier: 'La République n'a pas besoin de savans ni de chymistes: le cours de la justice ne peut être suspendu.' Thus was Lavoisier included in the batch of (28) farmers-general and condemned to death with them for having mixed water and harmful ingredients in the tobacco which the farmers sold." The same writer says that Lavoisier had rendered valuable service to the State in matters financial. He was called upon in 1791 to help in the reorganization of the national Treasury, in which he established such a system of accounts that it was possible every night to tell the exact position of the public balances. A financier, hated by Robespierre and by Marat, who had denounced him in his Journal, Lavoisier knew well that to be accused was to be guillotined. Marat, as Michelet says, aspired to scientific distinction, of which the French Academy considered him unworthy. In this there was cause enough for his prejudice against the great discoverer of oxygen. Marat was unfortunately a member of our profession, and there seems no doubt that he received the degree of M.D. from the University of St. Andrews.[2] Marat did not pass an examination for the degree, which was granted on the recommendation of two doctors of medicine resident in Edinburgh, and probably did not even go to St. Andrews to receive it. Coffinhal had been a medical student, but he seems to have had no liking for the work, and for him we need not blush. He is described as being particularly repulsive in appearance and as being in the habit of bullying prisoners and making brutal jests. When any of the accused attempted to defend himself Coffinhal would shout, "Tais-toi, tu n'as pas la parole!" (Hold your tongue, it is not your turn to speak.) On one occasion he condemned a fencing-master to death, and looking hard at him he said, "Well, old cock, parry that thrust if you can."

He seems to have been a burly and passionate ruffian, for when Hanriot, who commanded the soldiers of Robespierre's party, came to report his ill success, Coffinhal in rage and disappointment threw him out of the window—a way of marking disapproval which was surely excessive and certainly unnecessary. He escaped arrest for a time but was not long afterwards betrayed and executed. It poured with rain on his last morning, and many of the crowd used their umbrellas to thrust him violently in the chest, crying, "Ha! Coffinhal, parry that thrust if you can!" While others shouted, "Coffinhal, Coffinhal, tu n'as pas la parole!"

Our sense of justice may be gratified by reading of his fate, but the blood of all the ninety-six, including Robespierre, who perished in the affair of Thermidor, could not make up for the loss of the great chemist at the age of 50. The small gang of homicidal fanatics and ruffians who had usurped control of the Republic during the Terror had no right to speak in her name. Before and after this time the French Republic thoroughly appreciated the importance of science to the State.

[1] See Michelet's *History of the French Revolution*. Translated by C. Cocks. (London: Bohn. 1848.) Vol. II, pp. 546-7.

[2] *Two Medical Tracts by Jean Paul Marat, M.D.* Edited, with an Introduction, by J. B. Bailey. (London, 1891.)

British Medical Journal.

SATURDAY, DECEMBER 1st, 1923.

THE TRAFFIC IN DANGEROUS DRUGS.

EVIDENCE continues to pour in from various sources and from many lands of the widespread abuse of cocaine, morphine, heroin, and other drugs of addiction, as well as of the subtle ramifications of the nefarious and highly profitable trade in these perilous commodities.

In the Norman Kerr Memorial Lecture published this week (p. 1013) Sir William Willcox retold to the Society for the Study of Inebriety the familiar story of how the prescription of drugs for beneficent medical purposes has led to habituation and abuse. He endorsed the principles and administration of the Dangerous Drugs Act, which has been in operation in Great Britain since 1920, and added that other drugs than those scheduled in that Act, such as veronal, Indian hemp, sulphonal, and even paraldehyde and chloroform, were liable to similar abuse and might lead to various degrees of mental and physical degeneration. A Home Office Committee is investigating the relative toxicity and liability to abuse of cocaine and the substitutes which have been suggested to take its place, and we publish this week a preliminary note by Mr. E. Watson-Williams on some experiments he has been conducting in the pathological laboratory of the University of Bristol with cocaine, novocain, stovaine, alypin, butyn, and atoxodyne; they have led him to conclude that the dose that causes serious symptoms bears a different ratio to the minimum lethal dose in the case of different drugs of this class. Thus in the case of cocaine it would appear that a small fraction only of the lethal dose may occasion syncope and alarming symptoms. He states that the proprietors have supplied him with notes of five deaths from the clinical use of butyn, and he urges caution in its application.

Dr. Courtois-Suffit of Paris, who has done so much to call attention to the dangers of cocaine, has recently published[1] a paper, written in conjunction with Dr. Giroux, on the spread of the cocaine traffic and cocainomania, dealing especially with the social danger thereby created. The authors relate the story of the discovery of coca, and describe its physiological action and the physical, mental, and moral results of its abuse by the cocaine addict. The euphoric effects of cocaine are said to differ from those of morphine. While the latter confers a passive and voluptuous blissfulness, the former vouchsafes a sense of volition-exaltation, of expansive energy, and of triumphant personality. The mental alienation and moral perversion of the cocaine maniac are dramatically described; the tricks of the traders in the drug are disclosed, and their huge profits indicated. Suggestions are made for increasing the penalties that may be inflicted on those engaging in the illicit traffic, for the better control of international commerce in cocaine, for an informed propaganda among medical men and teachers regarding its perils, and for the prolonged detention and treatment of its victims.

Meanwhile, from the international point of view, we have to record that at the fourth assembly of the League of Nations, which met at Geneva from September 3rd to 29th, forty-nine States were represented, and delegates from the United States attended for the first time. Certain resolutions were passed dealing with the opium question and the Hague Convention; further pressure is to be put upon Switzerland, Persia, Albania, and some of the smaller American republics to ratify the Convention. Regret was recorded that a number of the countries which are parties to the Convention have as yet failed to make effective the control of the importation and exportation of dangerous drugs. A new conference was suggested to consider how to give effect to Part II of the Convention, which aimed at the suppression of "prepared" (that is, smoking) opium, and at the reduction of the amount of raw opium destined for its production. Yet another conference was also foreshadowed to consider again the restriction of morphine, heroin, and cocaine to medicinal and scientific purposes, and the limitation of the production of raw opium and the coca leaf to the amounts required for such purposes. As the date proposed for the first of these conferences is mid-July, 1924, and the second is to follow the first, it is evident that the object aimed at by the International Opium Convention of 1912—namely, the suppression of the abuse of opium, morphine, and cocaine—is not yet within sight.

It has been officially claimed that India has carried out the terms of the Opium Convention in spirit and in the letter. It is difficult to appreciate the justice of that claim. The Convention provided that the export of "prepared" (smoking) opium should be prohibited, either "immediately" or "as soon as possible"; nevertheless India continues to export some 10,000 chests of opium annually, the bulk of which is used for smoking, a practice denounced by the Indian Government as "essentially a social vice."

Bishop Brent, the eloquent and able chairman of the first Opium Conference, addressing the Advisory Committee at Geneva on May 25th last, quoted "the sinister principle laid down by Warren Hastings in 1735," when he said, "Opium is not a necessary of life, but a pernicious luxury which ought not to be permitted except for purposes of foreign commerce only, and which the wisdom of the Government should carefully restrain from internal consumption." Modern official apologists, however, appear to endorse that principle, with the reservation that they regard it as a necessary of life for the Indian natives. Bishop Brent challenged contradiction of his assertion that it was "indisputable that in the history of human affairs there has never been any trade more lucrative or more indifferent to human welfare than that in opium and its derivatives. Governments and individuals alike have made the fruit of the poppy a source of revenue by the degradation of their customers."

Abyssinia has been admitted to the League of Nations, but Afghanistan remains outside, and from figures with which we have recently been supplied it appears that in Russian and Chinese Turkestan and in Afghanistan much opium is raised, and a flourishing and highly profitable trade is carried on unchecked and unsupervised. The appalling excess of production of the poppy and the coca shrub over any conceivable legitimate use of the products of either, and the consequent diversion of the surplus to vile and vicious purposes, calls aloud for speeding up the machinery devised nearly twelve years ago for the suppression of this evil.

[1] *Revue de Médecine*, August, 1923.

THE STANDARD OF FAT IN COW'S MILK.

THE importance of securing a pure milk supply is indisputable. It must be pure not only in the sense that it is free from contamination, but that it is free from dilution by the addition of water. The latter practice may yield large illicit profit and is not easy of detection. The householder may complain on occasion that on a particular day the milk supplied to him was "poor," but the vendor is always ready with some plausible excuse, and if a sample taken by an inspector and submitted to analysis is found to be so poor as to justify police court proceedings the vendor cheerfully pays the fine inflicted out of the hundred per cent. profit he has made by selling water by the pint at the price of milk. Or he may raise a defence by what is known as an appeal to the cow—that is to say, by pleading that the milk was sold as it came from the cow and was poor at the source. For many years the test of added water has been the percentage of milk fat in the milk examined. The Sale of Milk Regulations, 1901, made by the Board of Agriculture, laid down that "Where a sample of milk contains less than 3 per cent. of milk fat, it shall be presumed, for the purposes of the Sale of Food and Drugs Acts, 1875-1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction therefrom of milk fat, or the addition thereto of water." This standard has always been considered a low one, and in those few instances where a sample of milk drawn direct from the cow has been shown to be under the standard the explanation has been usually accepted that the animal had been poorly fed or that the inferior quality of the milk was due in some measure to the default of the dairy farmer, who might so arrange the diet of the cow as to increase the quantity of milk given while reducing its quality. It was, however, long the opinion of prominent agriculturists that diet does not perceptibly affect the quality of milk.

The difficulties in securing the conviction of a vendor who has sold milk containing less than 3 per cent. of butter fat have been increased since, in the case of Hunt *v.* Richardson, a Divisional Court of five judges by a majority of one quashed a conviction of justices sitting in petty sessions who had held that in the case before them the deficiency in milk fat was due to the manner in which the farmer had fed the cows with the object of obtaining a large supply of milk without regard to the quality, and that therefore the milk was not of the nature, substance, and quality demanded by the purchaser. The time was ripe, therefore, for settling the question in dispute by precise, scientific, and authoritative investigation. Such an investigation has been carried out at his farm near Basingstoke by Mr. Wilfred Buckley, C.B.E., who for many years past has concerned himself with improving the milk supply of the country and with educating the public in the importance of securing such improvement. The result of this investigation is embodied in a pamphlet recently issued by Mr. Buckley.[1] The milk of each of 65 shorthorn cows was analysed each morning and evening during a period of thirty-nine days by Mr. Slim on behalf of Dr. R. A. Lyster, medical officer of health for Hampshire. The milk of each cow was weighed and the necessary calculations made in order to determine the percentages of butter fat and of solids not fat in the morning's milk and in the evening's milk from the entire herd for each day, and for the entire period as well as for the combined morning and evening milk of each day. The results of these examinations are set out in considerable detail by Mr. Buckley, who has come to the conclusion that the percentage of butter fat in the mixed milk of a herd of shorthorn cows "may be less than 3 per cent. in the morning but in all probability not less than 3 per cent. in the evening," and that it "will exceed 3 per cent. over a period of twenty-four hours." With regard to the milk of individual cows, he considers that the percentage of butter fat varies considerably from day to day while the milk is produced under apparently similar conditions; that it increases during the period of lactation and as the interval since the last milking is diminished; that it is affected only slightly when the food of the cow is changed from winter rations to grass; that it may often be less than 3 per cent., especially in the morning; and that it should never be calculated for recording purposes on the basis of the analyses of the milk made during a period so short as twenty-four hours. He is also of opinion that it is not possible to classify milk on the basis of butter fat content, as is now required by the Scottish Board of Health in regard to certified milk, unless there be facilities for mixing the milk of the entire herd, analysing it, and adding butter fat on occasions when the percentage of fat is less than the prescribed amount, a proceeding which he believes to be impracticable. The net result of the discussion on pasteurization at the National Milk Conference reported elsewhere in this issue (p. 1062) with regard to fat is that the process does not cause any diminution, although the amount of cream that rises may be smaller when ordinary methods are used. The effect of pasteurization on the constitution of milk seems to be chiefly to coagulate the lactalbumin and to render the calcium and phosphate contents more or less insoluble.

The results of Mr. Buckley's investigations are disquieting to those who are engaged in administering the law with respect to milk supplies, coming as they do from so authoritative a source. He expresses the hope that they will not have the effect of protecting a single individual who is so dishonest as to adulterate milk that is offered for sale, but, as he rightly adds, progress cannot be made on any basis that is contrary to facts.

[1] *Some Observations on the Butter Fat in Milk.*

CRIME AND INSANITY.

THE Committee on Crime and Insanity appointed in July, 1922, has made its report, and we publish elsewhere an analysis of its argument and the full text of the recommendations at which it has arrived. The Committee does not consider that any drastic change in the law should be made; it advises that the famous rules made by the judges in M'Naghten's case should be maintained, subject to two qualifications. The first is that a person charged criminally with an offence is to be held irresponsible for his act when the act is committed under an impulse which the person was by mental disease in substance deprived of any power to resist. The phrase "in substance" will undoubtedly lead, and has, indeed, already led in the daily newspapers, to some criticism, since different interpretations may be given to it by different judges. The other proposed modification in the law is with regard to the verdict which should be returned when a person is found to be irresponsible on the ground of insanity. The Committee recommends that the verdict should be that "the accused did the act (or made the omission) charged, but is not guilty on the ground that he was insane so as not to be responsible, according to law, at the time." At present

the verdict in such a case would be guilty but insane. The Committee had before it reports of the British Medical Association and of the Medico-Psychological Association; it does not accept the recommendations of the Medico-Psychological Association, but concurs in substance with the report of the British Medical Association. The Committee proposes that the powers of the Home Secretary should be retained and even slightly extended. It considers that the present system, both of law and practice, has been proved to work satisfactorily, vindicating the law with firmness and humanity. The report of the Committee, over which Lord Justice Atkin presided, will require very careful consideration, and will, we have no doubt, receive it both from the British Medical Association and the Medico-Psychological Association. If it is to be of any effect fresh legislation will be required, and both associations, working, as we hope, together, will have to use their influence to persuade Parliament to give attention to the matter. It is in the highest degree desirable to avoid in future the sort of public agitation that arose in connexion with the case which led to the appointment of the Committee. The public has a right to approve principles, but their application to any particular case should be a matter for judicial decision and administrative action after all the facts have been ascertained according to a method of procedure previously agreed.

TUBERCULOSIS IN FRANCE.

At a meeting of the Tuberculosis Society in London on November 16th, Dr. Evrot, speaking in French, gave an interesting account of the antituberculosis work that is being done in France. He said that in 1900 Calmette at Lille launched a scheme for dispensary treatment, and in 1902 Grancher had put into operation his measures for the boarding out of children of tuberculous families. In 1912 in France, with its population of 40 million, the deaths from pulmonary tuberculosis numbered close upon 70,000. At the present time it had 600,000 tuberculous subjects, including 112,000 ex-service men. The war stimulated antituberculosis measures, and two Acts were passed, one in 1916 and the other in 1919, which constituted the French antituberculosis charter. The first provided for the establishment and subsidy of dispensaries, the second linked sanatoriums with the dispensaries, and contained compulsory clauses novel to French legislation, whereby each department had to provide certain sanatoriums within a period of ten years. The amount voted in the State budget for 1923 for antituberculosis measures was 14,000,000 francs, while the various municipal and departmental budgets for 1922 contained 48,000,000 francs for the same purpose. For the dispensaries alone the State credits rose from 3,000,000 francs in 1920 to 7,000,000 in 1923. In July, 1917, the Rockefeller Foundation set up in France an effective organization against tuberculosis which for five years had assisted the French authorities with money and services, and this had made it possible to start dispensaries in many departments and to undertake educative propaganda. At the beginning of 1923 the American mission ended, and its functions devolved upon a national committee whose work was limited at first to the care of tuberculous ex-soldiers, but had now been extended to embrace the whole population and to supervise every side of the antituberculosis campaign. It co-operated with the Ministry of Hygiene in controlling the dispensaries and other organizations, it had a school for re-education, where ex-patients were taught agriculture, and it organized congresses. The geographical situation of France made it possible to create a number of marine sanatoriums under varying climatic conditions. Altogether there were 53 sanatoriums, with 11,000 beds, for children suffering from surgical tuberculosis, in addition to institutions for heliotherapy in the mountains. The sanatoriums for pulmonary tuberculosis had 6,500 beds in all. The most popular establishments from the economic and social points of view were hospital sanatoriums, but, unfortunately, the State did not contribute to the expense of setting them up. They were managed as hospitals, and received contagious and bedridden patients. In the sanatoriums proper the cases were rigidly selected. The main preventive establishments were the dispensaries, which now numbered 450, and their outfit was being made more complete year by year. In large numbers of them there were x-ray installations, and in 1922 more than 40,000 screen examinations were made. The medical staff was recruited from doctors specializing in the study of tuberculosis. France had not nearly as many tuberculosis officers as England, but the number was increasing. Five hundred certificated health visitors were attached to the dispensaries (150 of them in Paris), and the number would be 600 by the end of the present year. There were nine schools for the instruction of these health visitors, and, to make the posts attractive, a pension scheme had been started. Examinations at the dispensaries were very systematic; repeated examinations of the sputum were made—50,000 in 1922—and contacts were also examined. The dispensaries were consultative, and no treatment was given except to necessitous persons. Monthly reports were made, and the graphic records and classifications were the same as in this country. It was not easy to estimate the effect of all this work upon the incidence of tuberculosis in France because the official collection of statistics ceased in 1918; but after five years' experience of the dispensaries some facts could be given. The mortality rate from tuberculosis at Lyons for the five years 1901-5, before dispensaries were in being, averaged 3.54 per 1,000 of population, but during the five years 1918-22, after the setting up of six dispensaries, it fell to 2.45. Even these figures did not reveal the full significance, for if the crowded working-class area of the town were taken, where also the dispensaries were concentrated, the mortality for the first period was found to be 3.84 and for the second 2.15. Dr. Evrot added that the feeling of general practitioners towards the dispensaries is sympathetic, though occasionally they view with a little disfavour the activities of the health visitor. But the whole-time tuberculosis officer in a section of the department of the Oise had had in twenty-two months 1,502 consultations on new cases at the dispensaries, and 431 of these were sent to him by local practitioners. The problem of arranging for rural dispensary services was not simple. In some districts travelling dispensaries have been organized. The Grancher system of boarding out had been widely adopted, and in twelve years 2,500 Paris children had been boarded out. The system, however, dealt only with children between the ages of 3 and 13; an effort is now being made to save children of an earlier age in affected homes, and despite the difficulty of the problem some headway is being made, thanks to the co-operation of the maternity services. Medical inspection in schools has been organized in most of the larger towns, and open-air schools have been started.

A MISSOURI DIPLOMA MILL.

THE *Journal of the American Medical Association* published the following note in its issue of October 27th: "During the past week the St. Louis *Star* has published a series of sensational articles exposing a traffic in fraudulent medical diplomas and high school certificates. A member of the staff of the paper is said to have purchased within the past ninety days a fraudulent high school certificate alleged to have been signed by W. P. Sachs and dated

1914 and also an equally fraudulent medical diploma purporting to be from the Department of Medicine of the National University of Arts and Sciences (which went out of existence in 1918), dated 1916. The reporter also obtained a certificate of licence to practise medicine in the State of Tennessee, the name of the person to whom the licence was originally issued having been erased and the newspaper man's name filled in in its place. The newspaper presented its evidence to State and federal prosecuting authorities and reports that, as a result, Drs. Ralph A. Voigt and D. R. Alexander, both of Kansas City, Dr. Robert Adcox of St. Louis and Professor W. P. Sachs, also of St. Louis, have been arrested." In its next issue our contemporary published a more detailed account of what the *Star* had published, and illustrated it by facsimiles of the diplomas purporting to be granted by the Department of Medicine of the National University of Arts and Sciences, St. Louis, Missouri, and the Progressive College of Chiropractic, Chicago, Illinois. From an article in the issue of the *Journal* for November 10th we gather that the States of Kansas and Connecticut are among the few States where the regulations for admission to the profession of medicine are still very lax. The position in Connecticut with regard to what our contemporary calls the Missouri diploma-mill seems to have been first considered by the Commissioner of Health for the State, and then by the States Attorney. A special grand jury is investigating the matter in the State of Connecticut and it is clear that the results so far obtained are attracting much public attention. According to a message from the *Times* correspondent, it appears that the action in Connecticut has induced the authorities of the State of New York to move; the correspondent states that according to the New York Board of Health there are between 1,500 and 2,000 impostors practising medicine in New York City, and that many of them are so-called graduates of the St. Louis College of Physicians and Surgeons of Missouri. The New York Board, it is further stated, has revoked the licences of all doctors claiming to be graduates of this school. This is as far as we can carry the matter at present. The *Journal of the American Medical Association* has long carried on a very spirited fight against the degradation of the profession of medicine by quackery, licensed and unlicensed. In one respect reformers in the United States are worse off than we are, because the licensing of practitioners of medicine is not a national matter but one reserved to each State of the Union. The *Journal*, however, has pegged away, and one legislature after another has been convinced until now the backward States can be counted on the fingers of one hand.

ALASTRIM AND MILD SMALL-POX.

THE question of the separate existence of alastrim or its identity with small-pox, about which there has been some controversy, has recently been raised in a discussion at the Académie de Médecine of Paris, when Professor Léon Bernard read a communication[1] based on the examination of four cases in negroes he had lately seen at Havre, and on information obtained from the medical officer of the boat which brought the patients from the Antilles. Professor Bernard proposed to apply the term "alastrim" to these cases, and appears to be a supporter of the doctrine that alastrim and small-pox are two distinct diseases. He has been brought to this opinion by several considerations, such as the absence of constitutional disturbance and a prodromal rash in alastrim, but he is also impressed by the fact that in the cases he saw the eruption had only a vesiculo-pustular stage with hardly any suppuration and a slow stage of retrogression, contrasting with the eruption of small-pox, which he thinks always passes through several stages and leaves a characteristic scar. He believes that the affection is confined to negroes and is always mild, in striking contrast with the gravity of small-pox, especially in black races. Professor Bernard, however, had some other objections, which he classed as biological, to the identity of alastrim and small-pox. He asserted that a large proportion of alastrim patients had previously been vaccinated, while some persons who had been revaccinated with or without success had nevertheless contracted alastrim. In the discussion which followed the reading of Professor Bernard's paper Dr. Lucien Camus, a well recognized authority on small-pox and vaccination, maintained that the symptoms mentioned by Professor Bernard were not invariably absent, as Moody[2] had described their occurrence in a paper based on a study of nearly 3,000 cases, of which 30 were fatal. Moreover, Leake's[3] experiments on the monkey and rabbit supported the view that alastrim was small-pox. The monkey might contract alastrim, and then become insusceptible to vaccinia. The rabbit did not show any eruption after inoculation with alastrim any more than it did after attempts to inoculate it with small-pox, but after inoculation with alastrim it proved refractory to vaccinia just as it did after inoculation with small-pox. As a general rule vaccination was a protection against alastrim, and successful vaccination in those who had had alastrim was analogous to the occurrence of successful vaccination in those who had had small-pox. The opinion that the two diseases are identical is shared by a large number of other observers at home and abroad; it finds support in the extraordinary variations in the severity of small-pox in different epidemics and, indeed, the same epidemic. Within the past few years, and especially in 1922-23, various competent observers have had opportunities of studying mild small-pox in England. Similar opportunities have occurred in the United States, Canada, Australia, and South Africa. We are not aware, however, that anyone has worked through such an epidemic in more than one of these countries, so as to have material for comparison. If there be any such, and especially if anyone is in a position from personal observation to report on the characters of the mild disease seen in other countries and to contrast it with cases that have occurred in this, a short statement on the subject would be useful.

[1] *Bulletin de l'Académie de Médecine*, October 2nd, 1923, p. 138.

[2] *Ann. Trop. Med. and Parasit.*, March 31st, 1922, p. 21.

[3] Public Health Reports, June 24th, 1921, p. 1437.

OPHTHALMOLOGY IN EGYPT.

THE Ophthalmological Society of Egypt has issued its bulletin for the year 1923.[4] It is edited by Dr. A. F. MacCallan, who with Rasheed Bey contributes an introductory paper on membranous conjunctivitis, a severe affection which occurs in Egypt but is fortunately rare. The authors state that no reliance can be placed upon smear preparation diagnosis; only complete laboratory examination by cultures and if necessary by inoculation will suffice. In one of their twenty-two cases the fauces were infected; in all varieties there was enlargement of the preauricular and angular glands; in most cases there was no history of contact with other cases of conjunctival or faucial diphtheria. The disease was never followed by paralysis of accommodation, one of the most frequent sequelae of faucial diphtheria; in 54.5 per cent. of the cases corneal ulceration was present on admission, but 63 per cent. suffered this lesion before the disease subsided, and 50 per cent. lost one or both eyes. Other cases of membranous conjunctivitis not due to the diphtheritic bacillus were encountered, and in them a variety of organisms were found; the rate of loss of the eye was lower—40 per cent. with one or both eyes lost. The most common cause of infection they believe to be either direct contact from one case

[4] Ophthalmological Society of Egypt, *Bulletin* for 1923. Cairo. Pp. 170.

membranous conjunctivitis to another, or transmission of the infection by flies; the next most common source is a diphtheria carrier with faucial, pharyngeal, and nasal lodgement. There was some evidence that the waiting room of the out-patient department had added to the number of cases. The authors remark on the rapid disappearance of the membrane after the use of antitoxin when the cause was a genuine diphtherial organism, in contrast to the lack of effect when other organisms were the cause. A considerable amount of albuminuria made prognosis bad. An outbreak of diphtheritic conjunctivitis which occurred in Assiout in September, 1922, and produced thirty-five cases, is described by Dr. A. M. Girgis. The local treatment employed was constant washing with eusol; quinine was tried but discarded as useless. Antidiphtherial serum was dropped into the conjunctival sac every two hours; silver nitrate was used as a paint once daily. The general treatment included tonics and serum injections (40,000 to 80,000 units). Of the patients attacked more than half (55 per cent.) were blinded; death occurred in 20 per cent. from heart failure. Dr. Meyerhoff records some observations on tuberculous eye diseases, which are rare in Egypt. "In general," he writes, "every case of very chronic iritis, with vitreous opacities and without pain, which does not react to aspirin and antisyphilitic treatment is suspect of being of tubercular nature. Unfortunately the tuberculin test . . . does not give a clear result. I know, through great experience gained in the war in Germany and Poland, where tubercular diseases have enormously increased, that the oculist may sometimes obtain general tuberculin reaction in rheumatic iritis, and on the other hand I have seen in some patients the iris of both eyes full of tubercular nodules without obtaining any general or local tuberculin reaction." The cases seen in Egypt were for the most part mild, and reacted well to tuberculin injections. There are many other papers of interest in the bulletin. Some are in Arabic; it might be of service if a brief summary of such papers were given in English or French.

DIMINISHED INCIDENCE OF TYPHOID FEVER.

A YEAR ago the Office International d'Hygiène issued a series of questions to the health authorities of the countries sending delegates to it. Information was asked as to the diminution of typhoid fever during the last thirty years, for opinions as to the causes of this diminution, and the practice as to antityphoid vaccination, and for a statement as to the need for antityphoid vaccination and its value. Replies were received by the Ministry of Health in this country from France, Holland, Switzerland, Denmark, Monaco, Sweden, and Spain. These replies have been analysed in a preliminary report[1] by Dr. Ricardo Jorge, the director of public health in Portugal and the delegate of that country to the Office. The detailed replies are given in an appendix. Professor Jorge points out that in those countries in which compulsory notification is in force data have now accumulated showing that there has been a marked fall not only in the mortality but also in the incidence of the disease. He gives the rates per 100,000 inhabitants. In Great Britain the incidence of typhoid fever has fallen from 38 in 1911 to 6 in 1922, and in Holland from 48.2 in 1892 to 16 in 1922. In Denmark the incidence was 150 in 1891 and 10 in 1921. In Switzerland it was 27.8 in 1901 and 8.6 in 1920, though there was a rise in 1904 to 37.9. In France the total number of cases, which was 31,206 for the two years 1912-13, fell to 15,815 for 1920-21. The number of deaths per 100,000 inhabitants has fallen in Great Britain from 17.3 for 1891-94 to 2.28 for 1916-20, in Holland from 12.5 to 5, and in Switzerland from 11 to 2.12 during the same periods. In France the total number of deaths, which in 1906 was almost 5,000, was less than 3,000 in 1916, or approximately a mortality of 7 per 100,000 inhabitants. In Spain the mortality has fallen from 44.1 for the quinquennium 1901-5 to 29 for 1916-20. The factors in the general decline in typhoid fever are purification of the water supply, removal of excrementitious matter by sewerage, notification of cases, supervision of foodstuffs capable of conveying infection, precision in diagnosis by serum tests, and progress in the hygienic education of the public. In countries where a fall in the disease has taken place as a result of these factors there is no necessity to employ, much less to enforce, prophylactic inoculation, except in the rare case of a circumscribed outbreak. On the other hand, in countries where typhoid fever is still very prevalent, inoculation is of the greatest value, and should be undertaken as far as possible by the public health authorities.

[1] *Bull. de l'Office International d'Hygiène Publique*, September, 1923, p. 1146.

RESEARCH IN TROPICAL MEDICINE.

THE annual dinner of the London School of Tropical Medicine was held on November 21st under the presidency of Sir Ion Hamilton Benn, deputy chairman of the Seamen's Hospital Society. In giving the toast of "The School" he said that it had been fortunate in having for its founders two such great men as Mr. Joseph Chamberlain and Sir Patrick Manson. From its inception twenty-four years ago the number of students had steadily increased. It was not content to teach the elements of tropical medicine to men who were going to tropical countries, but had encouraged research in its own laboratories and sent out expeditions to investigate diseases on the spot. Twenty such expeditions had been organized; Dr. Newham, director of the department of tropical pathology in the school, had only recently returned from British Honduras, and Dr. Thompson, director of the department of protozoology, from his second expedition to Rhodesia to investigate blackwater fever. The chairman then referred to the expedition to Samoa, of which we gave some account last week (p. 995). In concluding his speech he made reference to the approaching transfer of the Tropical School to the School of Hygiene. Though the Tropical School might lose some of its autonomy it would retain its identity within the new school, and would benefit by close association with workers in other branches of preventive medicine. The toast of "The Guests," given by Sir Arthur Clarke, chairman of the Seamen's Hospital Society, was acknowledged by Sir James Allen, High Commissioner for New Zealand, who said that his Government rejoiced to have the assistance of the school in the discharge of its duties in the Pacific.

ROCKEFELLER INTERNATIONAL HEALTH BOARD.

THE organization founded in 1909 by the initiative of Mr. J. D. Rockefeller under the name of the International Health Commission changed its name in 1916 to the International Health Board, and was first concerned with ankylostomiasis, or, as it is usually called in America, hookworm disease; during the first five years of the Commission's life more than a million persons in the United States of America were examined microscopically, and of these 441,408 were treated; in 1913 the work of eradicating the disease was extended to other countries. The ninth annual report,[1] for 1922, of the International Health Board contains a brief summary of its origin, and shows that, in addition to having measurably diminished hookworm infection all over the world, progress has been made towards reducing the ravages of malaria, and that

[1] International Health Board: The Rockefeller Foundation. Ninth Annual Report, for 1922. 61, Broadway, New York. 1923. (Pp. xix + 169; 70 figures.)

a vigorous campaign is still being waged against any vestiges of yellow fever. At the close of last year the only areas of yellow fever remaining in the western hemisphere appeared to be Western Mexico and a narrow coastal zone in Eastern Brazil from Ceará to Bahia; in March, 1923, however, an epidemic occurred in Bucaramanga, Colombia. Since September, 1917, the Board has worked with the French Government and other existing agencies in a comprehensive campaign against tuberculosis, and in response to an invitation from the Spanish Government it is investigating the conditions of health in a country where the typhoid death rate is 33.6, as against 3.5 per 100,000 in the State of New York. The report contains some remarkably good illustrations which show, among other things, the methods of treatment and instruction of the patients. The appendix contains much interesting information of a more technical character, such as the details of treatment and a critical summary of methods of estimating the severity of hookworm infection by the haemoglobin index, worm counts, and ova counts. In another section of the appendix the methods of malaria control are summarized, including a description of Dr. M. A. Barber's method of killing the larvae of the anopheles mosquito by Paris green, which is especially useful in the case of waters so choked with vegetation that fish cannot reach the larvae. In a short section on "Man-made malaria or man-made breeding places for anopheles" the causes, such as railways, agricultural irrigation, and gold dredging, responsible for 60 per cent. and in some places 75 per cent. of the cases of malaria, are detailed.

MALARIA IN MALAYA.

THE report on the Medical Department of the Federated Malay States for 1922 states that the estimated population in that year was 1,360,876, including about 6,000 Europeans. The birth rate for the year was 25.65, and the death rate 25.74, per 1,000. The death rate was the lowest recorded for twelve years. The infantile mortality rate was 170.83, compared with 183 per 1,000 in 1921. The principal diseases from which death resulted were malaria (11.44 per 1,000), dysentery and diarrhoea (1.78), pulmonary tuberculosis (1.76), and beri-beri (0.33). Malaria was thus, as always, the most prevalent disease. There were 26,072 cases treated in hospitals, with 1,403 deaths and a death rate of 5.38 per cent., against 37,049 cases, with 1,943 deaths and a death rate of 5.24 per cent., in 1921. Free quinine is always available, and is distributed throughout the country through the medium of subordinate native officials, police stations, and schools. On the advice of the Malaria Advisory Board each patient who has suffered from malaria in hospital is given a certain number of quinine tablets to take away on discharge. Cinchona febrifuge is being used in some hospitals and shows good results—in some cases better results than quinine. The following figures relate to field and laboratory work in connexion with anopheline mosquitos carried out by the Malaria Bureau during the year under review: Breeding places described 941, larvae identified microscopically 71,421, adults bred out and identified 23,621, adults caught in houses 10,327, adults tested for egg-laying capacity 1,257. Observations were continued throughout the year to determine whether the various species of anopheline mosquito have a definite breeding season or whether they are capable of breeding all the year round. In connexion with these observations the malaria research officer, Dr. H. P. Hacker, draws the following conclusions: "At the present stage it is impossible to base definite conclusions on the work in hand, but certain temporary deductions can be made. In last year's report it was stated that 'no definite correlation between species and the rainfall could be established,' and the main reason for this statement was that there were two increases in small pool breeders, one of which occurred in the wet and the other in the dry period of the year. But when the results of this year are added to those of last year it is seen that these increases in small pool breeders recur in a regular manner, and reasons for them occurring in the way they do have been suggested above. These reasons will form the hypothesis to be tested by the results to be obtained during 1923, and they will be confirmed if the results are similar to those obtained during the two previous years, which are the first two years of the present research."

WALLER MEMORIAL.

As was announced last June, the friends, fellow workers, and pupils of the late Professor Augustus D. Waller, F.R.S., and Mrs. Waller, have resolved to establish a memorial in recognition of their lifelong devotion to physiological investigation. The memorial is to take the form of a fund, to be used for the encouragement of scientific research. The fund will be administered by the Council of the London School of Medicine for Women, where Professor Waller was a lecturer in physiology, where Mrs. Waller was first a student, then demonstrator, and later a member of the council until her death, and where their daughter is lecturer in physics. Dr. Waller was lecturer in physiology at St. Mary's Hospital Medical School for nineteen years, and it has now been suggested that an additional memorial should be established in the form of a research room to be called the Waller Research Laboratory in connexion with the physiological department. A committee has been formed, of which Professor Winifred C. Cullis, of the London School of Medicine for Women, and Dr. J. S. Macdonald, Holt professor of physiology in the University of Liverpool, are honorary secretaries. Professor J. Mellanby, of St. Thomas's Hospital Medical School, London, S.E.1, is acting as honorary treasurer, and to him subscriptions should be sent. A subscriber who desires that his gift should be allocated to the St. Mary's memorial is asked to state this when sending his cheque. It is hoped that a sum of £5,000 may be raised; towards this £1,300 has already been subscribed.

THE committee of the Christie Hospital, Manchester, offers a prize of £300 for cancer research; the prize will be awarded in two instalments. Its object is to support research already in progress, and it is hoped in this way to stimulate isolated work apart from the systematic work done by the cancer research institutions. The assessors will take into consideration promising work which might fail for want of financial help. Candidates must be qualified in medicine or in a science cognate to medicine, and must submit evidence of original research work bearing on cancer, done and projected. This competition is open to workers of any nationality, but all documents must be submitted in the English language. Applications should be sent to the Chairman of the Medical Board, Christie Hospital, Manchester, on or before December 31st, 1924.

ON Wednesday, December 5th, a party of foreign medical statisticians, including delegates from Brazil, Bulgaria, Hungary, Czecho-Slovakia, and Russia, will be received by Sir Walter Fletcher at the National Institute for Medical Research at Hampstead. Dr. Brownlee and Dr. Major Greenwood have arranged for their benefit short discourses and demonstrations on statistical subjects.

THE collection of drawings of war injuries of the fundus oculi presented to the Army Medical War Museum by Dr. W. Wallace, late temporary captain R.A.M.C., is now in the museum of the Royal College of Surgeons of England and available for study.

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE.

CONGRESS AT SINGAPORE.

THE fifth Congress of the Far Eastern Association of Tropical Medicine was opened at Singapore on September 24th by Sir Laurence Guillemard, Governor of the Straits Settlements. The attendance numbered over 300, and included Government delegates from the Straits Settlements, the Malay States, Australia, British India, British North Borneo, Burma, China, Formosa, Hong-Kong, Indo-China, Japan, Macao, the Netherlands Indies, the Philippine Islands, Sarawak, Siam, and the United States, as well as representatives of numerous universities, institutes of medical research, and officers of civil medical services.

The Association was founded at Manila in 1908, and its objects, as stated in its articles of constitution, include the union of the medical profession of the Far East into one compact organization, the promotion of friendly intercourse between scientific men, and the enlightenment of public opinion in regard to the prevention of disease.

The fifth congress, under the presidency of the Hon. Dr. A. L. Hoops, Principal Civil Medical Officer of the Straits Settlements, was of exceptional interest and value, and owed its success in no small measure to the active co-operation of the Malaya Branch of the British Medical Association and its indefatigable honorary secretary, Dr. J. W. Scharff, who acted as secretary and treasurer of the congress. Nearly sixty papers were submitted, most of them dealing with tropical diseases but many also of more general interest. It is intended to publish the full transactions in two volumes before the middle of next year. In the meantime a report of the congress has been published giving a summary of the business transacted.

The Opium Evil.

Members of congress laid stress on the necessity of employing national and international organization, as contrasted with merely local effort, for the control of many tropical diseases. An illustration was given by Dr. Galloway in connexion with the opium habit. At present opium smokers among the Straits-born Chinese are few, and will probably be extinct in the next generation. The difficulty lies in the immigrant Chinaman, who naturally brings his habits with him and dominates the position. The local Government endeavoured to reduce the use of opium by raising the price of "chandu," with the result that smoking was stopped to a great extent and chandu or dross swallowed instead. Thus the measure reacted in an injurious manner on the public health, especially that of the Chinese immigrant, by forcing him to adopt methods in comparison with which opium smoking was comparatively harmless. The obvious way, according to Dr. Galloway, and that offering the greatest promise of success, would be to effect an intimate *rapprochement* with China and to support her in an agreed programme for the suppression of opium.

Ankylostomiasis.

Dr. Sawyer, of the Commonwealth Department of Health, who contributed a paper on nation-wide and international organization, referred to the advantages that were derived from the expansion of the merely local efforts to control ankylostomiasis in Northern Siam into a nation-wide campaign under the Siamese Red Cross. In further illustration he gave an account of the Australian hookworm campaign. Various local efforts had been made without any tangible results, one of which, in Northern Queensland, revealed an amount of disease sufficient to cause concern as to the future progress of the region. As a result of these revelations the Commonwealth Government, the International Health Board, and the State of Queensland started, in 1919, the hookworm campaign. One by one all the Australian States came into the arrangement, together with the three large territories New Guinea, Papua, and Northern Territory. Early in 1923 the hookworm survey of the whole of Australia had been completed, and the campaign had developed from local operations into a nation-wide project. Dr. Sawyer enumerated many advantages accruing from these combined efforts. For instance, in a country such as Australia, with an area of nearly three million square miles, observations could be made under most varied conditions and compared. Thus the area investigated included tropical areas, some with an average annual rainfall of over 150 inches, others with less than 10 inches; and the rainfall was found to be the dominant factor in determining the amount and distribution of infection in the tropics and subtropics. Under the conditions found in Queensland, hookworm infection in people of European derivation was usually high if there were more than 50 inches of rain in the year, and, as a rule, almost absent with less than 40 inches. Among the aborigines, many of whom went barefoot, the infection rates were much higher than among Europeans. In the vast low-rainfall areas of the interior there was no hookworm infection in any race. With regard to treatment and prophylaxis, the important observation was made that better results were obtained when less effort was devoted to securing complete cures of all infected persons, and more emphasis placed on visiting the communities often, under a systematic scheme of permanent hookworm control, which would bring every community under some degree of treatment every year. The scheme has been in operation only a short time, but from the figures derived from the last survey, which practically included the whole population, a great reduction in the percentage of cases has been effected.

Beri-beri: Malaria.

An important matter discussed had reference to the control of beri-beri. At the meeting held in Batavia in 1921 it was recommended to the Governments concerned to take action in this matter, and the question was thoroughly debated at the present meeting on the proposals submitted by the Philippine delegates—namely, that rice should be graded according to its P_2O_5 content (that containing 0.5 per cent. to be called "standard rice," that containing less "supermilled rice"); that the consumption of supermilled rice should be discouraged by placing a tax upon it; and that the significance of the difference between the two grades should be impressed on the population by means of an educational campaign. These proposals received practically no support. It was objected that the P_2O_5 content afforded no test of the degree of milling; that rice may have a P_2O_5 content below the standard and yet be undermilled and contain a sufficiency of vitamins. It was further pointed out that serious inconvenience would arise from the fact that undermilled rice cannot be kept in stock for any length of time, and that the objections arising from overmilling could be overcome by improved methods of cooking and by combining other foods with rice. In some countries, Siam for instance, a large proportion of white rice is exported, and the adoption of the proposals would seriously interfere with trade. The proposed measures would, moreover, probably have the effect of raising the cost of living of the poorer classes and cause widespread discontent. Mr. W. G. Maxwell, Chief Secretary to the Government of the Federated Malay States, briefly defined the position thus: "We pay a small and gradually diminishing price in the form of beri-beri, for the widespread advantages of a cheap and abundant food supply for the people."

The President delivered an address on the prevention of diseases in the tropics, and a considerable proportion of the available time of the congress was devoted to the question of malaria. It might be said that the real work of eradication was only just beginning in spite of the fact that 100,000 lives had been saved in Malaya during the last twenty-five years; since the start of definite anti-malarial work in 1912, 30,000 had been saved in Singapore alone by the health officers and engineers. A great advance had taken place in the knowledge of the natural history of the various species of mosquito concerned in infections in different districts; this had led to the realization of the need for preventive treatment being directed in accordance with the habits of the species concerned; previously treatment had been rather haphazard, but different places often required different methods. Better directed drainage methods and oil treatment had resulted in very considerable financial economies, and in some places the increase in

land values, consequent on drainage, had more than covered the total expenditure, including that of subsequent development for cultivation or building purposes.

Singapore gave the members of the congress a hospitable welcome, and many excursions were made into the surrounding districts for the inspection of works of sanitary interest. The visit of the congress was also made the occasion for laying the foundation stone of the new King Edward College of Medicine, the ceremony being performed by Lady Guillemard. The college, which was founded in 1905 and is therefore the youngest medical school of the empire, was originally intended to be a training centre for subordinate local practitioners, but in 1916 a complete medical course was planned and the diploma was recognized by the General Medical Council as a registrable qualification. Dr. G. H. Macalister, the Principal, referred to the fact that some one hundred and sixty licentiates of the college were in practice in Malaya and expressed the hope that, with ample accommodation, the usefulness of the college would expand in further directions. There will be ample facilities for post-graduate study and research.

The next congress will probably be held in Japan in October, 1925, under the presidency of Professor S. Kitasato.

CRIMINAL RESPONSIBILITY.

REPORT BY LORD JUSTICE ATKIN'S COMMITTEE.

THE Committee on Insanity and Crime appointed by the Lord Chancellor in July, 1922, has now issued its report.[1] The Committee was a purely legal and administrative body. It consisted of Lord Justice Atkin (Chairman); Sir Ernest Pollock, K.C., late Attorney-General and now Master of the Rolls; Sir Leslie Scott, K.C., late Solicitor-General, and, in succession to him, Sir Thomas Inskip, K.C.; Sir Herbert Stephen, Bt., Clerk of Assize for the Northern Circuit; Sir Richard Muir, Senior Treasury Counsel at the Central Criminal Court; Sir Archibald Bodkin, Director of Public Prosecutions; Sir Edward Troup, late Permanent Under Secretary of State, Home Office; Sir Ernley Blackwell, Assistant (Legal) Under Secretary of State, Home Office; and Sir Edward Marshall-Hall, K.C. The terms of reference were:

"To consider and report upon what changes, if any, are desirable in the existing law, practice, and procedure relating to criminal trials in which the plea of insanity as a defence is raised, and whether any, and if so what, changes should be made in the existing law and practice in respect of cases falling within the provision of Section 2, Subsection 4, of the Criminal Lunatics Act, 1884."

By subsequent correspondence it was made clear that the then Lord Chancellor (Lord Birkenhead) intended the inquiry to have a wide scope and to include consideration of the rules in M'Naghten's case, which since 1843 have formulated the English law as to the criminal responsibility of persons alleged to be of unsound mind.

Two medical documents for submission to Lord Justice Atkin's Committee were issued in March last, and reproduced in these columns.[2] The one was a memorandum of evidence on legal responsibility for crime prepared under the authority of the Council of the British Medical Association; the other was a report drawn up by the Medico-Psychological Association of Great Britain and Ireland.

The subject had engaged the attention of the British Medical Association for some years past, and in 1913 a special subcommittee of the Medico-Political Committee was appointed to consider the present state of the law in its regard to legal responsibility for crime. In due course it presented a report, which was approved by the Annual Representative Meeting in 1915, and the memorandum submitted to Lord Justice Atkin's Committee was based on that report. The Medico-Psychological Association's report was prepared for it by a special committee including medical superintendents of asylums, several persons now or formerly commissioners in England and Scotland, Lord Chancellor's visitors, several persons concerned with the feeble-minded and with prison administration, and barristers.

Both reports were supported by the evidence of specially appointed witnesses; they are printed as appendices to the report now issued. In regard to them the Committee says:

"We have thus had unequalled opportunities of becoming acquainted with the considered opinions of the most eminent representatives of the medical profession on this much debated subject. We desire to express our sense of deep obligation to the Associations generally and to their individual members for their valuable assistance in this respect. Unfortunately for us the difficulties presented by criticism of the existing law from the medical side were not removed; for, as will be seen, the two reports are, on the main question, in direct opposition to one another. The British Medical Association would retain the existing law with a modification as to lack of control: the Medico-Psychological Association would sweep away the present rules and substitute other questions for the jury, which they formulate. After careful consideration we come to the conclusion that we cannot accept the recommendation of the Medico-Psychological Association. In substance we concur with the report of the British Medical Association. It seems right, however, that we should not pass away from a report presented to us with such great professional authority without stating some of the reasons for our conclusions."

One of the difficulties encountered by the Committee in the Medico-Psychological Association's report was that that association gave "no clue to what they regard as the test of criminal responsibility," or, again, "what was that ought to make a person of unsound mind immune from punishment for any act he might commit in violation of the criminal law." In this connexion the Committee discusses the far-reaching effect of granting immunity to everyone who can be said to be of unsound mind when the medical conception of unsoundness of mind is considered. Of this medical conception it says:

"It is accepted by the witnesses for the British Medical Association, and, of course, by us. 'Unsoundness of mind is no longer regarded as in essence a disorder of the intellectual or cognitive faculties. The modern view is that it is something much more profoundly related to the whole organism—a morbid change in the emotional and instinctive activities, with or without intellectual derangement. Long before a patient manifests delusions or other signs of obvious insanity he may suffer from purely subjective symptoms which are now recognized to be no less real and of no less importance in the clinical picture of what constitutes unsoundness of mind than the more palpable and manifest signs of the fully developed disorder which may take the form of delusions, mania, melancholia, or dementia.'"

In certain cases, such as that described to the Committee by Dr. Carswell, the difficulty of diagnosing the accused person's state of mind, and, when some unsoundness of mind is indicated, of establishing the non-relation of the act to the unsound state of mind, would, in the Committee's view, introduce so much uncertainty into the administration of the criminal law as to create a public danger.

The Committee next addresses itself to showing that much of the medical criticism directed at the M'Naghten rules is based upon a misapprehension:

"When once it is appreciated that the question is a legal question, and that the present law is that a person of unsound mind may be criminally responsible, the criticism based upon the supposed clash between legal and medical conceptions of insanity disappears. It is not that the law has ignorantly invaded the realm of medicine; but that medicine, with perfectly correct motives, enters the realm of law."

The Committee can find no good reason why a medical expert in giving evidence at a criminal trial should not fully develop his reasons for holding the prisoner to be of unsound mind. But having given evidence of such unsoundness of mind, he should then be directed to the question of fact which determines the legal issue—namely, the question formulated at present by the M'Naghten rules. A wise discretion would allow all necessary expert evidence as to the general mental condition, as a preliminary to evidence directly bearing on the ultimate legal issue raised by the plea.

Thus the Committee holds that the existing rule of law is sound: that a person may be of unsound mind and yet be criminally responsible. If a person intends to do a criminal act, has the capacity to know what the act is

[1] Cmd. 2005. To be purchased through any bookseller or directly from H.M. Stationery Office. Price 6d. net.

[2] BRITISH MEDICAL JOURNAL, March 24th, 1923, p. 518 and p. 520.

to know the act is one he ought not to do, he commits a crime. Whether he should be punished for it is not necessarily the same question, and the Committee prefers not to discuss penological theories. Accordingly it considers that the present rules of law for determining criminal responsibility as formulated in the rules in M'Naghten's case are in substance sound. Upon this it adds:

"The rules as to criminal responsibility apply not only to cases of murder but to the vastly greater number of less serious offences. In these cases mental conditions can be, and are in practice, daily taken into account in awarding punishment or in deciding whether any punishment should be awarded. In the case of murder the judge is not given a discretion as to punishment; but the executive is vested with large powers of mitigating the legal sentence. These powers, as will appear later, we think it is essential to retain. But we should view with alarm any such extensive alteration in the legal principles of criminal responsibility as is suggested by the Medico-Psychological Association. The importance of the effect upon the trial of minor offences cannot be overstated. Insanity is admittedly incapable of definition; its diagnosis difficult; its effect upon conduct obscure. The proposed rules throw upon the prosecution the onus of establishing that the insanity said to exist was not calculated to influence the act complained of, and, in default of discharge of such onus, would compel the court to order the accused to be detained during His Majesty's pleasure. The effect must be to transfer many inmates of prisons to criminal lunatic asylums and to bring within the portals of the latter many persons who are now, without any public disadvantage, placed in the care of their relatives."

A matter not covered expressly by the M'Naghten rules is the difficult question of loss of control caused by unsoundness of mind. The memorandum of the British Medical Association recommended that a person should be held to be irresponsible if prevented by mental disease from controlling his own conduct, unless the absence of control is the direct and immediate consequence of his own default. It was established to the Committee's satisfaction that there are cases of mental disorder where the impulse to do a criminal act recurs with increasing force until it is, in fact, uncontrollable. In practice, in such cases, the accused is found to be guilty but insane. In fact, the accused knows the nature of the act and that it is wrong; and the M'Naghten formula is not logically sufficient. The Committee thinks that it would be right that such cases should be brought expressly within the law by decision or statute; that it should be made clear that the law does recognize irresponsibility on the ground of insanity where the act is committed under an impulse which the prisoner is, by mental disease, in substance deprived of any power to resist. It has no doubt that if this matter were settled most of the criticisms from the medical point of view would disappear.

The Committee discusses briefly the existing practice and procedure in criminal trials where the defence of insanity is raised. These observations are grouped under the headings "Unfitness to Plead," "Evidence," "Verdict," and "Appeal." The general effect of the views therein expressed will be found briefly stated in the summary of recommendations printed below. It will be noted, in particular, that the Committee is in favour of abolishing the present verdict of "Guilty but insane" and reverting to the more logical and more satisfactory verdict "Not guilty on the ground of insanity," this phrase being extended so as to make clear that it is not insanity that is at issue, but that degree of insanity to which the law attaches irresponsibility.

The Committee next considers the second part of its reference—namely, whether any, and if so, what changes, should be made in the existing law and practice in respect of criminal lunatics. The subsection of the Act in question deals only with the procedure for inquiring into the sanity of persons under sentence of death. Powers are conferred upon the Home Secretary by other subsections in the same Act. In discussing the existing procedure reference is made to the history and development of the various statutory powers consolidated and amended by the Act of 1884. Since the Insane Prisoners Act of 1840 no prisoner under sentence of death has ever been executed as to whom a certificate of insanity has been given under the statute for the time being in force, and the Committee has no doubt at all that the Home Secretary should have power to remit to asylums prisoners reasonably certified to be insane, whether under sentence of death or of imprisonment.

"The question for the Home Secretary is not simply the legal question, 'Was the prisoner responsible for his act?' though it may be his duty to review that finding; under the statute the question is a medical question, 'What is the prisoner's present state of mind?' In investigating that question the medical man must necessarily consider the circumstances of the crime for which the prisoner has been convicted."

"It seems to us that the power in question is a necessary completion to the legal principle of responsibility; and that while the latter should be strictly maintained the executive should have the reasonable means afforded by the statute of alleviating any hardship that may be caused by the single punishment for murder. Both Medical Associations approve of the continuance of the powers under the subsection."

The Committee thinks it right, however, that the power of acting upon the certificate of insanity conferred on the Secretary of State should be in terms discretionary. Facts may become known which entitle the Home Secretary to allow the law to take its course notwithstanding the certificate. But if no such circumstances exist, the present practice of exercising the discretion in only one way—remitting the prisoner to an asylum—should be continued. On this matter alone Sir Herbert Stephen disagrees with his colleagues; he thinks that the certificate of insanity should not necessarily determine the exercise of the discretion, but that the Home Secretary might properly in some cases leave for execution a prisoner rightly certified to be insane.

The Committee concludes with a testimony to the scrupulous care and devotion with which the duties of the Home Office are performed, both in regard to the maintenance of the law and the legitimate protection of the prisoner. In its opinion "to the insane person justice is done."

Summary of Recommendations.

The Committee summarizes its recommendations as follows:

"1. It should be recognized that a person charged criminally with an offence is irresponsible for his act when the act is committed under an impulse which the prisoner was by mental disease in substance deprived of any power to resist. It may require legislation to bring this rule into effect.

"2. Save as above, the rules in M'Naghten's case should be maintained.

"3. Where a person is found to be irresponsible on the ground of insanity, the verdict should be that 'the accused did the act (or made the omission) charged, but is not guilty on the ground that he was insane so as not to be responsible, according to law, at the time.' The existing statutory provision in this respect should be amended.

"4. Until such amendment the verdict should always be taken and entered as guilty of the act charged, but insane so as not to be responsible, according to law, for his actions at the time.

"5. Accused persons should not be found on arraignment unfit to plead except on the evidence of at least two doctors, save in very clear cases.

"6. The present law as to appeal should not be altered, *i.e.*, there should be no appeal on the finding of insanity either on arraignment or after trial and, in the latter case, either as to the act or omission charged, or as to insanity.

"7. Provision should be made, under departmental regulations, for examination of an accused person by an expert medical adviser at the request of the prosecution, the defence, or the committing magistrate.

"8. Provision for a panel or panels of mental experts is unnecessary.

"As to the Criminal Lunatics Act, 1884.

"9. It is essential that the statutory power under Section 2 (4) should be maintained.

"10. The procedure under the subsection is satisfactory and does not require amendment.

"11. The discretion of the Secretary of State should be exercised as at present."

NATIONAL MILK CONFERENCE.

DISCUSSION ON PASTEURIZATION.

A NATIONAL Milk Conference, called together by the National Clean Milk Society, and supported by about thirty organizations, including the British Medical Association, was held at the London Guildhall on November 21st. Representatives were present from seventy-five local authorities and from forty-five bodies interested in public health or in dairy farming. The Conference was devoted to the single subject of pasteurization. In the morning Mr. WILFRED BUCKLEY presided (in the absence of Viscount Astor), and in the afternoon LORD DAWSON OF PENN.

Mr. RICHARD SELIGMAN opened the Conference with an exhaustive description of the methods and processes of pasteurization. He said that although great progress had been made in the details of procedure it was not possible to point to any advance in the principles of milk preservation since the days of Louis Pasteur himself. He believed that the electrical treatment of milk held promise for the future, but it needed further development before it became a commercial process. Mr. A. T. MATTICK dealt with the effects of pasteurization on the cream line. His opinion was that a smaller volume of cream might be expected to appear on milk after pasteurization by ordinary methods, though if the temperature did not exceed 145° F., and the time of exposure was not more than 30 minutes, there should be an increase rather than a diminution of the cream layer. Flash pasteurization at high temperatures would diminish the cream. A third communication was by Professor S. B. SCHRYNER, who dealt with the chemical changes produced in milk by pasteurization. He thought it improbable that either the fats or carbohydrates underwent any change during the process; the proteins, on the other hand, might be definitely altered. The lactalbumin could readily undergo coagulation and be converted into an insoluble product. The calcium and phosphate contents of milk were in the process of heating rendered more or less insoluble, and in this condition were likely to be lost.

The Bacteriological Aspect.

Professor J. M. BEATTIE dealt with the subject on its bacteriological side. He gave an account of eight experiments, all of which led him to the conclusion that the pasteurization of milk as practised commercially in this country was not likely to destroy the common disease-producing bacteria, and in the case of bacteria more resistant to heat the process must be even more ineffective. He attached far greater importance to the destruction of the tubercle bacillus than to that of organisms of the colon type, and it was generally agreed that it was more difficult to destroy *B. tuberculosis* in milk than to destroy *B. coli*. He believed, however, that pasteurization carried out at a standard temperature somewhat higher than at present in use,* say about 70° C. (158° F.), would bring about destruction, not only of the tubercle bacillus, but of all other important disease-producing organisms. Such a plant must be under skilled supervision, any variation of temperature must be instantly observed, and no portion of the milk must be allowed to escape exposure to the required temperature for at least 30 minutes. The present methods fell far short of establishing these conditions, with the result that pasteurized milk as commercially produced in this country was, so far as his studies went, an infective milk. An electrical method of sterilization developed in Liverpool gave constant and effective results; 99 per cent. of the total bacteria were destroyed, including all the *B. coli*, and, in every one of the experiments which he and Dr. Lewis had carried out, the *B. tuberculosis* as well.

Effect of Pasteurization on Vitamins.

Professor F. G. HOPKINS spoke on biochemical changes. The milk constituents which at present could not be isolated by ordinary chemical means were the ferments or enzymes, certain factors concerned in immunity, and the vitamins. The enzymes of milk were either present in amounts too small to be significant, or possessed such properties as suggested that they had no physiological function in the food, and the fact that they were destroyed in pasteurization was therefore without importance. The presence or absence of immunity factors was a matter scarcely germane to the present discussion. Vitamins called for more attention. Milk contained all the three (or four) known vitamins. In the case of two of them at least—Vitamin A and Vitamin C—the supply was minimal. When a food contained a minimum of these factors special importance must be attached to the balance which existed among them. He believed that in milk yielded by well fed cows the balance was somewhat nicely adjusted. A treatment of milk which tended to diminish the amount of any one of them was therefore, *ipso facto*, undesirable, but except in the case of one vitamin—namely, the antiscorbutic factor or Vitamin C—the assumption that pasteurization must inevitably destroy the vitamin was by no means justified. Pasteurization affected Vitamin B but little; Vitamin A, if protected from air, was also resistant to heat. A careful method of pasteurization, therefore, could be carried out without any appreciable destruction of either of these two. It was otherwise in the case of Vitamin C, but even in this case recently ascertained facts showed that there was greater stability than had been thought. If the public could be educated to understand that when an infant was fed on pasteurized milk it must be protected by the systematic administration of small quantities of fresh fruit juice or its equivalent there was, at any rate from this standpoint, no danger to be feared. He himself had never found any evidence of deterioration in general nutritive value (apart from this antiscorbutic factor) when milk was pasteurized or boiled, and Park and Holt in New York had found among infants fed on pasteurized milk, not only greater freedom from summer diarrhoea, but also a larger gain in weight, than among infants receiving raw milk.

The financial and commercial aspects of the question were treated by Mr. J. H. MAGGS (chairman of United Dairies, Limited), who said that if the public would realize that properly pasteurized milk when put into sterile bottles would easily remain sweet, if kept in the bottle in a cool place, for twenty-four hours after delivery, it would be possible to make one delivery a day the general practice, thereby reducing the necessarily greater expense (borne by the consumer) attached to pasteurization and bottle distribution.

General Discussion.

LORD DAWSON OF PENN, who presided over the latter part of the Conference, said that it was a matter for regret that the consumption of milk per head of population in this country was so small. It worked out at only one quarter of a pint a day, whereas in the United States the average individual consumption was at least three times as large. If the smallness of milk consumption was due to a want of appreciation on the part of the people as to the value of milk, this could be cured by education, but the problem of producing milk of proper standard quality at such a price as would be profitable to the producer and not too expensive to the consumer was more difficult. Just how far a compromise could be effected was a matter for the authorities, guided by scientific opinion.

In the course of some general discussion, Dr. ERIC PRITCHARD said that the breakdown of the "cream line" did not seem to him an argument against pasteurization. After all, the agitation to which milk was subjected on pasteurization was as nothing to the agitation it underwent once it entered the stomach. The same consideration applied to the breaking down of the chemical affinities of milk. He believed that heating did not induce changes in milk of any material importance from the point of view of the consumer. Captain S. R. DOUGLAS shared Professor Beattie's view that the ordinary degree of heating in the process of pasteurization was not enough to effect the object of rendering the milk perfectly safe. Dr. W. G. SAVAGE (M.O.H. Somerset) considered pasteurization to be in itself a confession of failure; it meant that the ordinary milk supply must be regarded as necessarily dirty. He favoured a stricter control in dairying. Some procedures which were perfect

* The range of temperature commonly employed in pasteurization is between 140° and 150° F.

paper proved in practice to be quite the reverse. Dr. STENHOUSE WILLIAMS, of the National Institute for Research in Dairying, urged the need for care in the training of employees, and pointed out that such need would still exist even if pasteurization were generally adopted, and might even become greater. Dr. HARRIETTE CHICK urged the necessity for seeing that milk received only a single pasteurization. Professor H. R. KENWOOD said that the voluminous literature dealing with this subject on the experimental side was most conflicting. The word "pasteurization" was used in different senses by different individuals, and therefore the facts published were not comparable and led to divergent conclusions. No doubt there were also enormous differences in the methods of pasteurization employed, and in the past there had been a good deal of inefficient pasteurization. But he was convinced that the milk supply in this country was getting cleaner every year, and he did not agree that pasteurization would prejudice its continuing improvement. Dr. S. G. MOORE (M.O.H. Huddersfield) felt that the objections to pasteurization were of little weight as compared with the pronouncements of great authorities in its favour. Pasteurization was not a confession of failure, but the recognition of inexorable facts.

The constitution of the Conference did not admit of any resolutions being usefully submitted, but the general impression of those who summed up the day's discussions was that more knowledge is needed as to what actually does take place during the process of pasteurization.

THE GENERAL ELECTION.

THE following is a list of medical candidates at the General Election and of the constituencies in which they are offering themselves so far as we have been able to ascertain. An asterisk indicates that the candidate represented the constituency in the Parliament just dissolved.

Dr. H. B. Bates (U.), Newton, Lancs.
Dr. Ethel Bentham (Lab.), Islington East.
*Sir George A. Berry (U.), Scottish Universities (returned unopposed).
*Dr. W. A. Chapple (L.), Dumfries.
Dr. R. Dunstan (Lab.), Ladywood, Birmingham.
*Dr. W. E. Elliot (U.), Lanark.
*Dr. F. E. Fremantle (U.) St. Albans.
Dr. O. Gleeson (Lab.), Portsmouth North.
Dr. L. Haden Guest (Lab.), Southwark North.
Mr. Somerville Hastings (Lab.), Reading.
Dr. G. B. Hillman (U.), Normanton, Yorkshire.
*Dr. J. E. Molson (U.), Gainsborough.
Dr. H. B. Morgan (Lab.), Camberwell North-West.
Dr. A. G. Newell (L.), South Tottenham.
Lieut.-Colonel A. C. Osburn, D.S.O. (Lab.), Walsall.
Dr. R. L. Ridge (L.), Enfield.
*Sir Sydney Russell-Wells, M.D. (U.), University of London.
*Dr. A. Salter (Lab.), Bermondsey West.
Dr. R. W. Simpson (L.), Newcastle-upon-Tyne North.
Professor Thomas Sinclair, M.D., R.U.I., F.R.C.S. (U.), Queen's University, Belfast (returned unopposed).
Dr. G. E. Spero (L.), Stoke Newington.
*Dr. T. Watts (U.), Withington.
*Dr. J. H. Williams (Lab.), Llanelly.
Lieut.-Colonel T. S. Beauchamp Williams (Lab.), Lambeth, Kennington.
Dr. R. M. Wilson (L.), Saffron Walden.

Sir Henry Craik, K.C.B., has been re-elected unopposed as one of the representatives of the Scottish Universities. A further note on the medical candidates appears in this week's SUPPLEMENT.

THE Great Western Railway has printed a small handbook on spas and inland resorts on its system. Particulars are given of Bath, Cheltenham, Church Stretton, Droitwich, Leamington, and Malvern; Torquay also is described and Weymouth, where the Nottington spa waters have again been made available. The spas of Central Wales from Builth to Llanwrtyd are mentioned, and there are many illustrations.

England and Wales.

OPENING OF NEWCASTLE MATERNITY HOSPITAL.

THE official opening by H.R.H. Princess Mary, Viscountess Lascelles, of the Newcastle-on-Tyne Maternity Hospital, took place on Saturday afternoon, November 24th. Her Royal Highness was received at the hospital gate by Lord and Lady Armstrong and the matron, and after hearing an address by the Duke of Northumberland declared the hospital open for the reception of patients. Dr. R. P. Ranken Lyle (honorary consulting obstetrician) then asked Lord Armstrong, as president of the institution, to accept a portrait of Sir James Y. Simpson, which was unveiled by Princess Mary, and Sir Thomas Oliver (honorary consulting physician) proposed a vote of thanks to the Duke of Northumberland for presiding. The various wards and other departments of the hospital were inspected and afterwards a nurses' carnival was held. The souvenir programme gives a concise account of the history of the institution and of the new building, from the pen of Dr. Ranken Lyle. The maternity hospital was founded by Act of Parliament on October 1st, 1760, in Rosemary Lane, where it was carried on for sixty-five years as an in-patient hospital, admitting on an average fifty patients a year. In 1819 a donation by Dr. Thomas Elliot formed the nucleus of a fund which enabled the governors to erect the building in New Bridge Street opened in 1826. An existing charity for attending patients in their own homes was amalgamated some years later with the maternity hospital and the name of the institution was altered to "The Lying-in Hospital and Out-Door Charity for Poor Married Women." Last year the number of indoor patients was 1,196, and 1,170 patients were attended at their own homes; the nursing staff numbered 36. By that time the accommodation had become quite inadequate for the number of patients seeking treatment, and the committee of management approached the Newcastle Corporation, which purchased the industrial schools site in City Road, and gave a portion of this land for a period of thirty years to the trustees. Reconstruction of portions of these buildings began last March and the institution was transferred from New Bridge Street to Jubilee Road in September. The present hospital consists of buildings surrounding three sides of a large quadrangle, with land available for future extensions. The site is centrally placed among the homes of the patients, and when the reconstruction work is finished the present buildings will provide a maternity hospital containing 90 beds for patients, 40 bedrooms for nurses, and ample accommodation for the domestic staff. There are separate quarters for the resident medical officers and students, and a large lecture hall. When finished the institution will be the largest maternity hospital in Great Britain. It consists of a series of units, compactly arranged. The maternity portion and the out-patient and pre-maternity departments are placed on the ground floor.

SMALL-POX PREVALENCE.

The Registrar-General's Return of Births and Deaths in England and Wales for the third quarter of the year has recently been issued. It shows for boroughs, urban and rural districts with populations over 10,000, and port sanitary districts, the number of cases of small-pox notified in the thirteen weeks ended September 29th. The total was 662. In the first half of the year the total was 1,225, so that instead of diminution there has been a tendency towards increase. In the whole of 1922 the cases were 973, so that with three months still to go, that figure has already been nearly doubled. And 1922 itself had a much greater number of cases than the immediately preceding five years. In 1917 there were only 7 notifications; in 1918, 63; in 1919, 311; in 1920, 280; and in 1921, 336. Reverting to the cases in the third quarter of the present year, the London administrative area had 11 cases; Derby 45; Durham 4; Gloucester county borough 355, the rest of Gloucestershire 43; Middlesex 5; Nottingham 121, of which 56 were in Kirkby-in-Ashfield Urban District, and 37 in Warsop Urban District; the North Riding of Yorkshire 11, all in Middlesbrough; the

West Riding 53, of which 28 were in Doncaster Rural District, and 17 in Bentley with Arksey; Monmouth 5; Surrey 2, and Wilts 2. The following areas had one case each: Buckingham, Lancaster, Oxford, Somerset, and Warwick.

Treatment of London School Children.

The London County Council is making provision for the treatment at elementary schools and among certain pupils at the secondary schools during the year 1924-25 of 34,440 eye cases, 13,250 ear, nose, and throat cases, 2,210 cases of ringworm, 63,580 minor ailment cases, and 117,810 dental cases. The only considerable increase is in the provision for minor ailment and dental cases. The cost is estimated at £86,740, an increase of about £900 on the expenditure for the current year. It is proposed that the present fees of the medical and dental staffs shall be retained. "The character of the work done," the report of the Education Committee states, "requires that practitioners with specialist qualifications should be appointed to the clinical posts at the treatment centres, and it is now made a condition that all officers appointed should have had such experience. If the rates of payment were reduced we feel it would be impossible to obtain the services of such persons. At present the standard of treatment is a high one, and we are of opinion that it should be fully maintained." For doctors the remuneration is at the rate of £80 a year for service at one session of two and a half hours' duration a week, for anaesthetists £75, and for dentists £60. In certain departments the session is of two hours' duration only, and here the remuneration paid to the doctors is at the rate of £66 a year.

Royal Dental Hospital, London.

The annual dinner of the staff and past and present students of the Royal Dental Hospital of London was held on November 24th, when Mr. G. Northcroft, O.B.E., presided over a company of two hundred. Among the guests were Sir Humphry Rolleston, Sir William Willcox, Miss Aldrich-Blake, and the deans of several of the London hospital medical schools. After the toast of "Our Most Illustrious Doctor, His Majesty the King"—the form in which the loyal toast is now ordained to be given in the schools of the London University—the chairman proposed the health of the past and present students. At the same time he demurred to the title "past students," because the best members of the dental profession as of the medical remained present students all their lives. He mentioned several recent developments at the hospital and school, including the provision of a research department, certain new scholarships, and increased facilities for post-graduate study. He also announced, evidently to the great satisfaction of the present students, that playing fields had just been acquired at Golders Green. Mr. G. G. Campion, President of the British Dental Association, in responding to the toast, said that he looked forward to the better and more systematic provision of post-graduate teaching in London. He thought that a "constellation of associations" could be formed from the present dental schools together with practitioners who had distinguished themselves in the various branches of the profession so as to permit of the organization at certain hospitals in rotation of courses of post-graduate teaching, each course to extend over one or two months. One of the students, Mr. F. G. Alford, the winner of the Saunders scholarship, also responded to the toast in a happy speech, in which he took occasion to deal faithfully with the examiners and the teaching staff. The dean of the school (Mr. H. Stobie) reported a very satisfactory state of affairs, with 353 students on the books (of whom 49 were women), 68 new entrants during the year, and 85 successful students out of 111 in the final examination for the L.D.S. A lectureship in radiology had been instituted, and many post-graduate lectures had been given, with an average attendance at each lecture of 150. He reported the resignations of Sir Frank Colyer and Mr. W. H. Dolamore, the former after thirty-three years on the staff (forty-six altogether in connexion with the hospital), and the latter after thirty-one. Both had done a great work for the school; Sir Frank Colyer was one of the finest teachers it ever had, while Mr. Dolamore was responsible to a great extent for the inclusion of the school in the University of London. Mr. B. Grellier, M.C., proposed the health of the visitors, a toast which was responded to by Professor W. Wright, dean of the London Hospital medical school, who appeared as spokesman for a "friendly tribe," and a successful evening came to an end with compliments to the chairman.

Scotland.

Research on Animal Breeding.

The third annual report of the Edinburgh University and the East of Scotland College of Agriculture Joint Committee on Research in Animal Breeding contains interesting results of the past year's research. The joint committee, under the chairmanship of Professor Sir Edward Sharpey Schafer, consists of representatives of the University of Edinburgh, the Royal (Dick) Veterinary College, and the agricultural interest. The director of the Animal Breeding Research Department, which was set up by the committee in February, 1921, at High School Yards, Edinburgh, is F. A. E. Crew, M.D., D.Sc., Ph.D. It is hoped that the agricultural community will recognize that the future of this institution lies largely with it. Reprints of published papers will be sent on request to persons interested, and working accommodation will be provided for anyone who wishes to undertake a piece of approved research. It is intended to build up a "clearing-house" of experience in which animal breeding records will be filed so that full information may be available in response to relevant inquiries. At a later stage it is hoped to obtain an institutional farm, where more special investigations can be conducted. In addition to research work and lecturing in the University, workers have read papers before various societies interested in biological and agricultural subjects in different parts of Scotland and England. An investigation into the pathology of the "bulldog-calf" of the Dexter breed of cattle has been completed. After two years' work the condition is found to be closely allied to achondroplasia in human beings. There is a condition of abnormal endochondral ossification, the adrenal and thyroid glands are defective, and the course of events is such as would follow removal of the anterior lobe of the pituitary. Suggestions are made to breeders for avoiding the occurrence of this monstrous calf. Several pieces of research on the problem of intersexuality in domesticated mammals and in fowls have been carried out. A large number of old hens showed gradual assumption of the male secondary sexual characters. One bird having functioned for three years as a female ultimately assumed male plumage and became the father of chickens. A very extensive experiment on the subject of inheritance of characteristics which distinguish the various breeds of domestic fowl is being carried out on several hundred fowls of different breeds. Other lines of research which are being pushed forward include experiments as to the part played by the ductless glands in regulating growth and sexual maturity; studies on the histology of the sexual glands of fowls, especially with regard to the question of sex reversal; and studies on the factors involved in incubation, in connexion with which the curious point has been noted that the temperature of the naturally incubating egg is considerably higher than that of the surrounding air. An attempt is being made by microscopical study of fleeces to translate the various grades of "kempiness" in the adult fleece into definite figures which will prove a basis for further genetical work.

Social Service Work at the Royal Infirmary, Edinburgh.

The Edinburgh University Settlement (School of Social Study) has for over seven months carried on a scheme of social service work in connexion with the out-patient department of the Royal Infirmary. It has been recognized by the managers. A report covering this period of organization has just been issued. Over 300 cases have been investigated; the work has consisted in following up needy cases in their own homes, providing the necessary means, if such are not forthcoming, for the treatment prescribed, whether it be medicine, nourishment, convalescent homes, or the readjustment of home conditions from a health point of view. The

funds of the University Settlement are used as far as they will go, but reliance is chiefly placed on help obtained from existing charities and other agencies; their resources are co-ordinated and cases requiring assistance are brought to their notice by the social workers. Among these agencies, the report mentions seven convalescent homes, six church organizations, three army associations, and eleven other charities of various kinds. In addition to these the social workers have obtained the co-operation of open-air schools, special schools, boy scouts, girl guides, clergymen, landlords, and employers. A special denture fund has been started to which people may contribute by weekly instalments; the Dental Hospital has arranged to give to patients utilizing this scheme the privilege of obtaining dentures 25 per cent. below the usual cost. Careful card records of cases are kept and if the cases are admitted to hospital the cards are passed on to the Samaritan Society, which does similar social work for in-patients.

Central Midwives Board for Scotland.

At the recent examination of the Central Midwives Board for Scotland, held simultaneously in Edinburgh, Glasgow, Dundee, and Aberdeen, 134 candidates appeared. Of this number, 124 were successful. Of the successful candidates 29 were trained at the Royal Maternity Hospital, Edinburgh, 47 at the Royal Maternity Hospital, Glasgow, 6 at the Maternity Hospital, Aberdeen, 10 at the Maternity Hospital, Dundee, 8 at the Queen Victoria Jubilee Institute, Edinburgh, 6 at the Cottage Nurses' Training Home, Govan, Glasgow, and the remainder at various recognized institutions.

At a special meeting of the Board held for the hearing of penal cases, Dr. James Haig Ferguson in the chair, a certified midwife was cited to appear for having been in attendance upon a patient suffering from puerperal fever and failing to notify the Local Supervising Authority thereof, and to take and record the pulse and temperature of the patient, and for other breaches of the rules. The Assistant Medical Officer to the district was present in support of the charges. The Board found the charges proved and instructed the secretary to remove her name from the roll and to cancel her certificate, and, further, to prohibit her from attending women in childbirth in any other capacity. At the same meeting a number of other cases of minor breaches of the rules by midwifery nurses were under consideration and it was resolved to issue warning notices in the circumstances.

Aberdeen Medico-Chirurgical Society.

The annual business meeting of the Aberdeen Medico-Chirurgical Society was held on November 22nd, when the following office-bearers were appointed for the ensuing session: *President*, Dr. George M. Duncan; *Vice-President*, Dr. Peter Howie; *Secretary*, Dr. H. Edgar Smith; *Recording Secretary*, Dr. H. Ross Souper; *Assistant Secretary*, Dr. Robert Richards; *Treasurer*, Dr. George Rose; *Librarian*, Dr. W. Clark Souter; *Editor of Transactions*, Mr. G. H. Colt; *Members of Council*, Dr. Alexander Ogston, Dr. James Crombie, Dr. W. Clark Souter, Dr. William Brown.

Ireland.

Representation of Queen's University, Belfast, in the Imperial Parliament.

Sir William Whitla, M.D., intimated lately that he would not seek re-election as representative of the Queen's University, Belfast, in the Imperial Parliament. At a meeting of the Unionist Association of the graduates held in Belfast on November 22nd, when Professor Lindsay, M.D., was in the chair, a resolution was passed by acclamation, conveying to Sir William Whitla the warmest thanks of the Association for the admirable way in which he had discharged his duties as their parliamentary representative. It was then unanimously decided on the motion of Dr. Leslie, seconded by Dr. R. Henry, to accept the recommendation of the Central Committee that Professor Thomas Sinclair, C.B., F.R.C.S., Colonel A.M.S., should be selected as candidate. Mr. Sinclair, in expressing his acknowledgements, said that as a professor in the College for thirty-seven years and as deputy vice-chancellor of the University he had acquired a sound knowledge of what the University wanted in all the faculties. It would be his earnest endeavour to investigate all educational proposals which might be made in the Imperial Parliament and support those which seemed to be good. Mr. Sinclair has been elected unopposed. Professor Sinclair, who graduated at the Royal University of Ireland in 1881, became F.R.C.S.Eng. in 1886. He is surgeon to the Royal Victoria Hospital, and professor of surgery in the University. He represents the Queen's University on the General Medical Council. During the war he served with distinction as consulting surgeon with the British Forces in France, and received the honour of C.B.

Stillbirth and Neo-natal Death.

At the third meeting of the Ulster Medical Society held in Belfast on November 15th, Dr. F. J. Browne, of Edinburgh, read a paper on stillbirth and neo-natal death. The deaths might be classified as ante-natal, intra-natal, and neo-natal. Asphyxia neonatorum was present in 50 per cent. of the intra-natal deaths. The causes were breech presentations, disproportion between head and passage, and occipito-posterior positions. He advocated conversion to normal of breech and occipito-posterior positions. He said that cerebral haemorrhage was found in 20 per cent. of all cases of stillbirth; he showed the relations of this accident to the age of the child and to tears up the tentorium cerebelli, and discussed the possible effect of these tears in producing maldevelopment of the brain, and to crime. A breech presentation was eighteen times more likely to cause a tear in the tentorium cerebelli and ten times more likely to be attended by haemorrhage; the doctor who did not convert a breech presentation might be guilty of increasing the criminal population. In discussing the influence of syphilis he referred to the curious phenomena of Colles's law, to the great rarity of a typical history of syphilis, to the great frequency with which the Wassermann reaction was negative in the mother of undoubtedly syphilitic children, and to "the lucid intervals" when a perfectly healthy child was preceded and followed by an undoubtedly syphilitic child. Passing to the observations he had made at the *post-mortem* examination of syphilitic infants, he said that spirochaetes might be found, sometimes in enormous numbers; the lungs, the thymus, the pancreas, and the uterus might all show signs. Each successive pregnancy should be treated up to the end. Mercury and arsenic should not be given to the pregnant woman together, as the kidneys were not able to stand the combination. Pneumonia was found to be the commonest cause of death of infants in the first fortnight; it was generally of the catarrhal type. Many cases of supposed overlying were really due to pneumonia; the only absolute evidence was microscopic. The necessity of ante-natal care and of regular clinics for this purpose was insisted on.

In the course of the discussion which followed, Professor Lowry expressed the hope that Dr. Browne's work would act as a stimulus to all members of the profession and would help to induce the public to establish ante-natal clinics and so bring Belfast up to the level required by modern science.

Professor Wilson advocated the establishment of a large and well equipped maternity hospital in Belfast. Dr. Thomas Houston pointed out the value of the Dreyer method of estimating a Wassermann reaction, and said it would be of great interest if cases of mothers with a negative result by Harrison's or Fleming's method could also be tested by Dreyer's method.

Dr. John Campbell, M.P., who proposed a vote of thanks to Dr. Browne for his address, said he had often wondered whether deformities might not have a syphilitic origin. Mr. R. J. Johnstone, M.P., seconded, and the vote was carried by acclamation.

India.

RANGOON MEDICAL SCHOOL.

THE annual report for 1922-23 of the Government Medical School, Rangoon, shows that there has been a steady increase in the number of medical students. During the year fifty new students were admitted, making a total of 223, and of these thirty-one qualified and seventeen gave up their studies for various reasons, leaving 175 students on the roll at the end of the year. At the primary and intermediate examinations 75 per cent. of the candidates proved successful at the first attempt. At the final examination twenty-three out of thirty-one candidates passed at the first attempt in April, 1922, and eight were referred for six months; in the examination in October, eight of the ten who appeared were successful.

MEDICAL INSPECTION OF STUDENTS.

The report on the medical inspection of the students of the Lucknow University in 1922-23, by Dr. Banarsi Das, medical officer, Lucknow University, states that of the 333 students who appeared for medical inspection, 252 were Hindus; 66 per cent. of them were married. Of 75 Mohammedans, 36 per cent. were married; all of the other six students were unmarried. Of the whole number 40 per cent. had defective vision, which in many instances could be corrected by glasses; four cases of trachoma were noted. Decayed teeth were observed in 47 cases; there were 9 cases of definite pyorrhoea, and 34 of spongy gums. Half of the students habitually chewed *pan*, and this was considered to aggravate unhealthy conditions of the mouth. Apart from those who smoked occasionally, 22 per cent. smoked habitually. Almost 50 per cent. of the students were strict vegetarians and the others lived on mixed diet; only two took alcohol, and one used *bhang* on rare occasions. Practically every student had had malaria, but not one case of enlarged spleen was detected. There were about a dozen cases of ringworm, and *T. versicolor* was also observed. The average height of the students (males), who were between 19 and 25 years of age, was 5 ft. 2 in., and the weight 8 st.; it is stated for comparison that in European countries between the same ages the average height is 5 ft. 7½ in. and the weight 10 st. 6 lb.

VACCINATION.

Some idea of the kind of organization that exists for vaccination in India may be gathered from the report for 1922-23 of Lieut.-Colonel W. M. Anderson, C.I.E., I.M.S., on the work in the North-West Frontier Province for that year. He states that the total number of vaccinations performed was 144,155, being a most satisfactory increase over the 100,219 of the preceding year. All the districts and agencies but one shared in the increase, and the average for each vaccinator was 3,837 operations, the highest figure being over 5,000. Of 108,460 successful primary vaccinations nearly two-thirds were in infants under 1 year, and the rest in children between 1 and 6 years. The rate was 40.3 per 1,000 of population against a five years' average of just under 37. The revaccinations numbered 30,188, compared with a five years' average of 17,980. Superintendents inspected a total of 100,846 cases and recorded a percentage success of 96.81 in primary vaccination and 87.56 in secondary operations. The only unsatisfactory feature appears to be, as pointed out in the report, the small number of vaccinations inspected by the civil surgeons themselves—namely, 3.67 per cent. of the total performed. In these cases the primary successes were 93.87 per cent., and in revaccinations 66.72, but Lieut.-Colonel Stiles Webb, I.M.S., who inspected 1,106 cases, reported a success ratio of 94.4, including both primary and revaccinations, so that the results tallied on the whole. The Vaccination Act is in force in only nine towns in the Province, and in Peshawar city it is still voluntary, so that a number of children remain unprotected, whilst the municipality has reduced its vaccinators from five to two. On the other hand, vaccination is gradually becoming more popular in the rural population, and resistance to primary vaccination is not offered. The result of the year's work is regarded by Lieut.-Colonel Anderson as being on the whole very satisfactory, though two superintendents had to be relieved of their duties owing to inefficiency and slackness, and vaccinators need the stimulus of constant supervision. In the past five years the small-pox mortality was 0.37 per 1,000 of the population, and during the year under report 0.05 per 1,000. Lieut.-Colonel Anderson is to be congratulated on a very interesting report and on the good work he is doing.

PASTEUR INSTITUTE, KASAULI.

The report for 1922 of Major Stevenson, director of the Pasteur Institute, Kasauli, presented to the annual meeting at Simla on September 6th, showed that 6,673 persons had received the full course of vaccine treatment for rabies, 559 being Europeans and 6,114 Indians. The decrease of 331 patients as compared with the previous year was due mainly to a decrease in the number from the Indian Army. The number of patients from the Punjab, United Provinces, Central Provinces, and Central India had increased, but a decrease was noted in Bengal, Bihar and Orissa, Rajputana, and Baluchistan. In the case of 402 persons treatment was not necessary or was discontinued on information being received that the biting animal was not in an infective stage of rabies. Of those who received treatment 67, including one European, contracted the disease and died. The financial statement showed a credit balance of 9,324 rupees.

NURSING IN INDIA.

Lady Reading has issued an appeal on behalf of the Lady Minto Nursing Association, of which she is president. The object of the Association is to enable Europeans to obtain skilled nursing at moderate charges by nurses selected in Great Britain; a sliding scale of fees is arranged, determined by the income of the patient. During 1922 the expenditure of the Central Committee of the Association amounted to nearly two lakhs of rupees, of which more than two-thirds was covered by receipts from nursing fees. A grant from the Government and interest on investments amounted to half a lakh, but the total subscriptions only amounted to 1,500 rupees.

To deal with the problem of nursing the native population in India Lady Reading has founded the Nursing Association which bears her name; it will seek to induce educated Indian women to enter the ranks of the nursing profession. Up to the present nursing in India has been monopolized almost entirely by English and Anglo-Indian nurses. In the last few years, as the *Pioneer* comments, circumstances have tended to reduce the factors which have deterred Indian women from seeking economic independence in a professional career, and Lady Reading's call is well timed. On the basis of English conditions, a minimum of 3,000 Indian nurses is required. From the report of the European Mental Hospital at Ranchi it appears that not only is there a total absence of nurses with any recognized qualification for nursing mental cases, but, according to the *Pioneer*, there seems hardly any incentive to obtain such nurses. Major Berkeley Hill, in the report, expresses the opinion that an attempt should be made to develop a body of trained nurses for mental hospital work.

Correspondence.

PIGMENT AND CANCER.

SIR,—I have read with much interest in your issue of November 17th the Bradshaw Lecture on melanosis by W. G. Spencer, and I regard it as an important and valuable contribution to the etiology of new growths. I feel, however, that the value of the paper will be to some extent counteracted if we accept the view put forward in your leader of November 17th, where you say that "the function of pigment in the biological world appears to be similar to its function in the industrial world: it is either decorative or protective." This restricts the use of pigment, but I consider that its field of work is of much wider extent. We are justified from facts already known in taking a much wider view of pigment as an active agent in the human economy. That it holds this position is clear from the admitted connexion between the chlorophyll of plants and the haemoglobin of the blood. The pigments of animals owe their origin in all probability to three fun-

tions—respiration, excretion, and nutrition, and though I mention nutrition last in the category it is probably first and foremost as a factor. The old process of what has been termed "skin nutrition by pigment" has no doubt, as regards the human body, passed away, and has been replaced by an internal nutritional digestive system. Nevertheless, the evidence of the old process still lingers with us. I admit that pigment is an intricate and tangled problem, but it is an agent in bodily metabolism which may be baffling but is none the less present. In an article that I published last year in the *Lancet* (vol. ii, 1922) I have put forward the view that cancer has possibly a pigmentary origin, and I think there is much to be said in favour of a thorough investigation of this hypothesis, for, as you say in your article, "the insidious change whereby a congenital melanoma assumes the character of a melanotic cancer remains a mystery, but research has shown that migration of branched pigmented cells may precede any sign of cancer." It is because I think that your leader limits too much the function of pigment in the biological world that I consider it may rather discourage a line of inquiry which, in my opinion, needs following up.—I am, etc.,

Glasgow, Nov. 20th. GEORGE THOS. BEATSON.

ANTLERS IN DEER.

SIR,—In Sir William Macewen's address to the International Society of Surgery on "Antlers in relation to the growth of bone" (BRITISH MEDICAL JOURNAL, July 21st, 1923), and in Dr. T. Johnstone's letter (BRITISH MEDICAL JOURNAL, August 6th) the growth of antlers has been discussed by two members of the medical profession, using that term to include surgeons. I have given a good deal of attention to this matter as a zoologist, and perhaps you will allow me to offer some comments.

Sir William Macewen has a much greater experience in observations on the growth of bone than I can claim, but on the other hand I think he is not very thoroughly acquainted with the zoological literature concerning antlers, which he would have found discussed and summarized in two books of mine—namely, *Sexual Dimorphism* (A. and C. Black, 1900) and *Hormones and Heredity* (Constable and Co., 1921).

It is usual to describe the antlers as Sir W. Macewen does, as branched outgrowths of the frontal bones of the skull, but strictly speaking this is not quite correct. The bone forming the antler is developed rather as an addition to the outside of the frontal bone than as a growth from that bone. The frontal bone is a dermal bone, and is actually formed in development in the fibrous tissue of the derma, at least the fibrous connective tissue within which it is formed is to be regarded as merely a deeper layer of the derma. The antler is formed in exactly the same way, within the fibrous derma, but it grows acropetally, first at one point, and then at other points at the end of the branches, as well as in thickness, the skin and epidermis of course growing *pari passu*, and forming the so-called "velvet." Sir W. Macewen insists that the cutis (or derma) of the velvet grows directly on the bone of the antler without any intervening periosteum. I fail to see the distinction. In all ossification the osteoblasts are derived from a layer of fibrous connective tissue, in endochondral ossification from the dense layer which surrounds the cartilage, and afterwards becomes the periosteum, in the case of dermal or membrane bones from the fibrous connective tissue of the skin. When the dermal bone is developed the fibrous connective tissue surrounding its surface is the periosteum. In the case of the antler the derma and periosteum are continuous, as a necessary consequence of the mode of ossification. Therefore I do not see the significance of the statement that the cutis of the velvet grows directly on the bone of the antler without any intervening periosteum. The innermost layer of the cutis is the periosteum. Sir W. Macewen states that very little inosculation occurs between the vessels of the velvet and those of the bone in the antler. Caton, who devoted much attention to the study of the antler (*Antelope and Deer of America*, 1881), states that arteries pass in from the periosteum to the antler transversely as in long bones, but as the antler becomes mature the superficial layer of the antler becomes solidified and the apertures which admitted the arteries become closed. Sir W. Macewen writes of two forms of ossification in the antler proceeding through the same base, which is cartilaginous. I cannot understand this statement, as I feel quite sure that there is no true cartilage at any stage in the development of the antler, or of the frontal bone with which it is connected.

I think there is no basis for the idea that the velvet exerts an inhibitive influence on the activity of the testis. Dr. Johnstone objects that if the testes are the *fons et origo* of the antlers why should their growth coincide with the quiescent state of the testes? The answer is that it has been shown that the hormone which stimulates the development of the antler is derived from the interstitial cells of the testis, not from the spermatic tubules. Moreover, when the testes are removed the normal development and shedding of the antler no longer take place. After castration of the adult the antlers are shed, and in the following spring they develop again, but the new antlers are not normal, they retain their velvet permanently and are never shed. The development of the antler, therefore, is not entirely dependent on the hormone from the testes, but the shedding of the velvet and the shedding of the antler are so dependent.

There can be no doubt that the shedding of the antler is due to the fact that its bone is dead. The pedicle is alive and covered with living skin, and phagocytes from the blood and lymph here attack the dead bone at the base, dissolve and absorb it so that the antler falls off. The next question is, What causes the death of the bone? The interior of the antler is spongy, but the base of it at the burr becomes consolidated and cuts off the blood supply, and so the bone dies. It would seem that the shedding of the velvet, which is rubbed off by the stag against trees while still vascular, is somehow connected with the death of the bone, for after castration the velvet remains and the antler is not shed, and the bony core of cattle which is covered with skin and horn corresponding to the velvet is never shed.

It would take too much space to discuss further the heredity and evolution of the antler. I will only remark in conclusion that it does not seem safe for a surgeon or physiologist to draw conclusions concerning ossification in general from observations on the antler, until he has thoroughly considered the physiology of the antler in relation to hormones and sex, and the question of its evolution.—I am, etc.,

J. T. CUNNINGHAM.

East London College, Mile End, E., Nov. 1st.

DIFFICULT MIDWIFERY IN GENERAL PRACTICE.

SIR,—Unfortunately at present the teaching of the various schools of midwifery is by no means uniform; there is no doubt that a general acceptance of whatever methods of treatment that give the best result would be followed by much benefit to the general public and advancement of the obstetric art.

With this object in view, I urge that some attempt to standardize treatment should be made. In the first instance we are faced with the difficulty of deciding which of the methods at our disposal will give the best result in a given type of case.

In order to facilitate comparison, I would advocate the publication, in one booklet, of the annual report of (say) six of the teaching hospitals in different parts of the country. The report of the maternity hospital with which I am most familiar usually consists of an introduction and statistics. In the former anything of note which occurred during the year is mentioned, and any departure from former treatment described, and the reasons for its adoption given. These six reports would afford a ready means of comparing results, and ultimately lead to a general adoption of the best methods of treatment. I am a believer in the value of internal pelvimetry, when indicated by the external measurements, or non-fixation of the foetal head at a time when it should be fixed. From the measurements thus obtained the pelvis is classed in that degree of contraction to which it belongs, and the appropriate treatment carried out. This method has considerable advantage over any other of which I am aware, in that it is as scientific, and exact, as is compatible with

a subject of this kind, and is quite sufficiently so for all practical purposes. Further, the obstetrician has the advantage of knowing (as far as possible) where he is, and what he is up against.

As another writer has mentioned, women frequently carry their children over time—especially is this the case in the minor degrees of contracted pelvis; hence it is of considerable advantage if labour can be safely induced by such means as the castor oil, quinine, and pituitrin method (Tweedy); or, as described in your columns. Should labour fail to ensue, there is no necessity to repeat the drugs for at least a week, and there is little likelihood of the patient falling spontaneously into labour for at least four days. In a breech presentation in a primipara, the first question should be, Is this presentation an accident, or is it due to a definite abnormality? If it is an accident, it is probably advisable to change it, whereas, if due to a minor degree of contraction, it were perhaps better left as a breech. The method of slow manual dilatation of the perineum to facilitate delivery, and avoid deep lacerations, might be worth a trial when much difficulty is expected.

The weak spot in the treatment of accidental haemorrhage by rupturing the membranes is that it may be a few hours before labour sets in, and the patient may bleed to death in the meantime. The great advantage of treating this condition by the vaginal plug is that, if properly applied, the bleeding will stop; but it has the drawback that it causes some degree of shock.

In transverse presentation, when called upon to decide between internal version and a destructive operation on the foetus, the condition of the child will form a useful guide. If the foetal heart is normal, or nearly so, version should be quite possible, but if the heart cannot be heard the child is probably dead, and there is no object in adding to the maternal risk out of consideration for it. When the condition of the mother and child are obviously bad the obstetrician will have to be guided by his experience and the circumstances of the case.

I do not know what success has generally attended the efforts to reduce occipito-posterior positions by means of abdominal pads, but it seems a method worth trying.

Even in the most outlying parts of the country the number of cases where it is necessary to perforate a living child must be very small. I do not think that occipito-posterior with a normal pelvis should be one of them.—I am, etc.,

R. E. TOTTENHAM, M.D., F.R.C.P.I.,
Dublin, Nov. 19th. Gynaecologist to Dr. Steevens's Hospital.

SIR,—The very interesting paper by Dr. S. Gordon Luker (November 17th, p. 913) is particularly welcome because it deals with the difficulties of midwifery practice encountered by the practitioners who, during the very time of a difficult case, may have many another urgent call upon them. Like Dr. Luker, I, too, would pay a tribute to their ingenuity and resource.

The importance of ante-natal care needs no insistence, but it is perhaps not so often put to practical use in cases of slight pelvic contraction as it might be. After so much untutored and prejudiced criticism of omnopon-scopolamine it is pleasing to find what an ideal combination this is in such cases, allowing moulding of the head without the patient paying so heavy a price in fatigue—and certainly, therefore, actually helping to minimize the risks of post-partum haemorrhage. Experience has taught me many other such advantages following its use in conditions which used to be considered certain contra-indications to its exhibition.

Another direct outcome of ante-natal supervision is noted under "large size of the foetal head." For many years it has been my custom to attempt some estimation of the relative sizes of pelvis and foetal head at not later than the thirty-sixth week. The results have justified the extra trouble—many patients who had had two (and in one three) stillbirths have had the third (and fourth) child living by a simple induction without the attendant possible risks of Caesarean section. These cases certainly do not call for a major abdominal operation. With these cases must be classed those of prolonged pregnancy: with the knowledge to-day at our command it is wrong to allow any pregnancy to go beyond the calculated date for labour, especially as we can be quite reasonably sure of the date from abdominal examination.

Many readers will remember a writer recently advocating version in all cases which were not already breech presentations. Remembering the definite risks (which are real if small) in any breech presentation as compared with vertex, and remembering, too, the rarer but serious risks such as extended arms with a breech, the exact conversion mentioned by Dr. Luker—that of converting a breech into a vertex—is much more reasonable. I can amply confirm Dr. Luker's opinion here, and the operation by external version is usually quite simple. As he says, "It is important to prevent breech labour in primigravidae."

Under the heading of ante-partum haemorrhage Dr. Luker says, "the patient is put to bed . . . and a hypodermic of morphine is given." But why not omnopon-scopolamine? It is better than morphine alone in every way. And, again, when speaking of post-partum haemorrhage he rightly draws attention to the importance of avoiding "a fair quantity of chloroform for a prolonged period." This administration, added to the "uterine exhaustion," due in many cases to difficult prolonged labour, is a strong factor in the production of post-partum haemorrhage. By administering omnopon-scopolamine throughout we have a certain means of reducing the necessity for much chloroform, and it also helps to prevent the uterine exhaustion, achieving the very objects we seek.—I am, etc.,

W. OSBORNE GREENWOOD, M.D., B.S.,
Harrogate, Nov. 22nd. F.R.S.Edin.

SIR,—In a paper read before the Dover and Folkestone Division of the British Medical Association and printed in the JOURNAL of November 17th, 1923 (p. 913), Dr. S. Gordon Luker of the London Hospital makes certain statements when discussing "Difficult midwifery in general practice." It appears to be quite a pastime these days with certain of our teachers to convince us (general practitioners) of how very little we have absorbed of all the teaching in midwifery which these same teachers have flung at our heads during our student days. We stood humbly in the corner and accepted the many indictments showered on us at Portsmouth during the Annual Meeting, and now comes Dr. Luker to throw a few more stones; but, Sir, this time may I raise my voice in humble protest?

To quote Dr. Luker's own words, the students of less than twenty years ago acquired only a "sketchy knowledge of essential principles," so that no matter how skilful an accoucheur he may subsequently have developed into he is, in Dr. Luker's opinion, unfit, by his training, to tackle difficult midwifery! Dr. Luker, however, later on, reassures us with regards to the "student of the present day," who goes through a far more efficient and intensive training when he should be putting his super-knowledge into practice. Dr. Luker solemnly expresses the opinion that the "real remedy lies in providing sufficient maternity beds in hospitals in all towns"—rather a nasty jar for our supertrained modern accoucheur: it appears that even he is suspect!

Further on, Dr. Luker says, "What the newly qualified doctor of the present day finds difficult, is how to apply his hospital methods to general practice." Exactly so, and who is to blame for this but his teachers? It is their duty, and privilege, to teach him that science and art of midwifery that will enable him the best to deal with difficult midwifery whenever and wherever called upon. And it certainly does not help to reassure him or increase his confidence in himself to be continually told what a hopeless sort of idiot he is when dealing with difficult labour. In my humble opinion, the time has certainly arrived when practical midwifery should be taught by a general practitioner, and not by a "specialist." Speaking for myself, I learnt more midwifery of the useful practical sort from general practitioners than ever I learnt from my specialist teachers, and Dr. Luker's own words appear to bear out the general truth of my statement.

Finally, when discussing the treatment of unreduced occipito-posterior positions, Dr. Luker says, "If red

tion cannot be performed" (by manual rotation of the head). "tentative and judicious trial of axis-traction forceps may be made. If the head does not descend *with gentle traction* (the italics are mine) perforation of the head should be performed." In fact, we are asked to kill a living child, for in nine cases out of ten it is living, as I have time and again proved by extracting with forceps after a very severe pull. Not only has the infant been alive and undamaged, but has lived to develop into a strong and active child. Moreover, the mother has not shown those dreadful injuries which our specialist teachers say are bound to occur. I can assure Dr. Luker that after an experience of midwifery ranging over twelve years, and including many unreduced occipito-posterior positions, I have never yet failed to deliver an undamaged and living infant, and very often it has only been after a prolonged and severe pull with the forceps.—I am, etc.,

Bradford, Nov. 24th. VINCENT NORMAN, F.R.C.S.Ed.

ANTE-PARTUM HAEMORRHAGE AND ECLAMPSIA.

SIR,—In reply to Professor James Young (November 17th, p. 945) I beg to deal with two points: the first concerns the relationship of concealed accidental haemorrhage with eclampsia; the second, the statement "that the acute and often extreme distensions of general medical and surgical practice are never associated with eclampsia." Professor Young quotes my view as to the first—"that the distension of the womb by the accumulating blood causes toxaemia by pressing on the kidneys and other abdominal organs." He states, "this view is disproved by the fact that there may be intense toxaemia where the concealed clot is no bigger than an apple"; and by the occurrence of abdominal distension in practice without eclampsia.

Of course, if eclampsia only occurred in cases of ante-partum haemorrhage, there would be force in Professor Young's criticism; but eclampsia may arise in the absence of ante-partum haemorrhage of any kind whatever. Professor Young states: "If anything is clear it is that in the eclampsia both of accidental haemorrhage and of placenta praevia there must be some common factor." The point is that there must be some factor common (yet peculiar) to *all* cases of eclampsia. Professor Young does not recognize this; he limits his inquiry to cases of concealed or unconcealed accidental haemorrhage. The occurrence of eclampsia in other types of case—namely, in primigravidae, in strong muscular and (otherwise) healthy pregnant women, in unmarried pregnant women, in cases of twin pregnancy, in hydramnios, and in certain cases of hydatidiform mole—without any abnormal position of the placenta (indeed without a placenta) and without any intrauterine haemorrhage at all, negatives his view. These cases put his conception, already discredited by other considerations, completely out of court—they show that placental separation, wherever the placenta, is not a cause of eclampsia.

As regards the second point, I may say that the error of expecting eclampsia or "uraemia" with the distension of intestinal obstruction is referred to in a small forthcoming volume; and the criticism dwindles down to the occurrence of abdominal distension with ovarian cysts and fibroids without eclampsia. It was Matthews Duncan—he who believed in the retentive power of the abdomen, and attributed to the suction of the thorax the elevation of the uterus in pregnancy, and the retraction of the partially born child's head between the pains—who first advanced this objection. In a footnote in his translation of Braun's book on *The Uraemic Convulsions of Pregnancy, Parturition and Childbed* (1857), Duncan stated that "the influence of simple pressure by the pregnant uterus seems to be much exaggerated"; and that "in ovarian dropsy, fibroid tumours, and a variety of other affections, no such result is observed from a pressure exactly like that of the gravid uterus, and often more severe and longer continued." Professor Young (like so many other obstetricians) accepts and repeats this criticism. He thinks it demolishes the mechanistic conception of eclampsia; he believes (presumably) that the pressure resulting from the growth of the pregnant uterus is "exactly like" that due to the growth of an ovarian cyst or fibroid tumour. But he is in error; he has at least omitted one consideration—the difference in effect on the abdominal wall with these two different kinds of growth. In the one (pregnancy), the recti become separated, as a rule by a considerable interval; in the other, separation either does not occur or is inconspicuous. I showed in my paper of 1913 that the separation of the recti in pregnancy could only be attributed to a greater contraction than normal of the transversales abdominis; and that this change postulates the conception of a raised pressure in pregnancy. Similarly, the absence of this separation with ovarian cysts and large fibroids shows the absence of such rise of this pressure. If the pregnant uterus with its increase in volume does not cause an increase of pressure in pregnancy, how explain the separation of the recti? If the separation in pregnancy is due to a mere yielding, a mere weakening, how explain the non-separation with fibroid tumour and ovarian cyst? A week ago I removed a fibroid tumour of the uterus weighing 32 lb.; the girth of the abdomen was 50 inches; there was no separation of the recti, or it was negligible. Yet am I to believe that the pressure within the abdomen—produced at the wash-tub and by carrying in the breakfast things—was as great as that produced with a smaller distension in pregnancy, *with the muscles spastic*, during similar movements?

Professor Young's argument is incomplete in his survey of the incidence of eclampsia; and as far as the mechanistic conception of eclampsia is concerned, does not touch fundamentals. It is plain he has not considered at all the abdominal wall in pregnancy; nor the pressure conditions which reign within the abdomen during this state.—I am, etc.,

London, W., Nov. 17th. R. H. PARAMORE, F.R.C.S.Eng.

VACCINATION PROPAGANDA.

SIR,—Dr. Killick Millard still stands on his head on the vaccination question; what a pity that such a respected medical officer should have side-slipped on this question. Everyone else is wrong and Dr. Millard is right. Assuredly there were 42 cases in the Poplar outburst, but instead of deducing that infantile vaccination should be given up, Dr. Millard should fight for revaccination at the age of 18 to 20, or thereabouts.

Dr. Millard honestly believes that the first cases of smallpox in a totally unvaccinated (never been vaccinated) community would be diagnosed at once and so everybody in the infected zone would be saved by swift vaccination. I deny his contention absolutely and wholly. It is playing with fire to imagine that the first case would be certain to take to bed at once. There is every likelihood that such a patient would move about for some hours, at any rate, and make Poplar's 42 cases insignificant in comparison with the number which would accrue. A man is a gambler who says that only one or two first cases would suffer and that every contact would be rounded up rapidly by the modern practitioner and the modern medical officer of health.

Will Dr. Millard please answer this: Suppose that I advise all parents in Deptford to give up vaccinating their babies and suppose the people were foolish enough to follow this advice. An outbreak takes place and two lads of 10 years are the victims. They become so ill that nobody could miss the diagnosis, and they die, not having been vaccinated. What am I to say to the father when he comes to the Town Hall and asks me whether it is true that vaccination prevented the contacts from contracting the disease, and if so, why was the same theory of prevention not applied to his dead children when in their infancy? Am I to say that I am an apostle of Dr. Millard and that we believe that a few deaths must be expected and accepted so long as the rest are saved? Will that satisfy the parents?

I claim that these two or three deaths are unnecessary, as unnecessary as the deaths or injuries inflicted by one or two doctors who are not so clean in their vaccinal methods as they should be. Can it be possible that Dr. Millard has unearthed his theory to placate the antivaccination stalwarts in Leicester? Let us hope at any rate that no others will fall from grace and plunge into this mirage of vague indefiniteness.—I am, etc.,

Deptford, Nov. 23rd. CHARLES S. THOMSON, Medical Officer of Health.

GARDEN CITY SANITATION.

SIR,—Dr. Hindhede's contention in the lecture an account of which was published last week (p. 996) is to the effect that the sanitary engineer keeps us in bondage and will not allow us to dispose of sewage in a remunerative way. This is interesting, and I hope you will allow me to reply. In theory Dr. Hindhede may be right, but in practice his plan is difficult to carry out. Dr. Hindhede does not seem to understand that there is only one "Garden City" at present in existence (by name Letchworth), though another (Welwyn) is just starting. Letchworth is an industrial town which has a population of 13,000 people. The people have nearly all come from other towns, been used to town life and amenities, and their object in living in Letchworth is to carry on industry under tolerable conditions for health and enjoyment. The houses all have gardens in the town, and these gardens are mostly cultivated and produce large quantities of vegetables and fruit. During the war the potatoes produced in Letchworth were a real addition to the food of the town. We have found that too large a garden is not a blessing to industrial workers. It would soon be an offence to public health to have a town like this without a proper sewage system. In the early days one or two people in the "town" area tried a "Poore" system of disposal, but they soon had to give it up. On the "agricultural" belt surrounding the town it is possible to do without sewage, but even then we find that smallholders wish to avail themselves of the town system if they can get on to it. My experience is that even in country villages the people dislike cesspools, and though the dry earth closet system is the ideal it needs constant supervision. If, on the other hand, town dwellers are to live in the country—and the crying need of to-day is for the people to get out of the big cities into the country—the services of the sanitary engineer will be necessary.

The Garden City is not a cranky idea, as Dr. Hindhede might lead one to suppose, but is a very sound practical solution for much of our social trouble of to-day.—I am, etc.,

NORMAN MACFADYEN.

Letchworth, Hertfordshire, Nov. 21st.

Obituary.

ARCHIBALD SLOAN, M.B., F.R.F.P.S.G.,
Glasgow.

THE late Dr. Archibald Sloan began his career as a teacher, but after a few years turned to the study of medicine. He graduated at Glasgow University, and some years later was elected a Fellow of the Royal Faculty of Physicians and Surgeons of Glasgow. He was a member for many years of the British Medical Association. My own acquaintance with him began when I was a medical student, and in the intervening years I saw very much of him and his work. He always endeavoured to look at questions from the viewpoint of "the other man." He was generous to a fault, sparing neither time nor money nor strength in his efforts to benefit others, or to assist those who were in pecuniary need. He had a remarkably fine intuition of clinical facts, and his resourcefulness at the bedside was singularly conspicuous. He was always interested in youth. He rejoiced in demonstrating "a case" to his young medical friends. He began practice in a crowded industrial locality, and though he was far from robust the amount of work he accomplished was extraordinary. He was exceedingly well known in that neighbourhood, and his professional brethren frequently sought his advice. For a few years he was casualty surgeon to the police. Later he became outdoor physician, and latterly assistant physician, to the Glasgow Maternity Hospital. He was also for several years dispensary physician to Anderson College Dispensary, later known as the Central Dispensary.

As his professional status became confirmed, Dr. Sloan retired from these posts, and began once more to interest himself in educational matters. He became a member of the Glasgow School Board, and devoted much time to the subject of physical training. Later on he was appointed medical officer to the students under the Glasgow Provincial Committee. In this position his ripe clinical experience was of great value, not only to the students, but also to "The Department."

In every position he occupied he endeavoured to benefit the moral as well as the physical welfare of those who came under his professional care. In some few cases, when disagreeable things were said to him (as they are to all of us), he would assume an expression of such complete stolidity and impenetrability that his detractors were baffled. At other times he would speak and act in such a way that it seemed to his friends as if he deliberately wished to be misunderstood. For the clerical profession he had much sympathy, and his professional services were freely and generously bestowed on many, not only in his own well loved denomination, but in all. It was characteristic of him that in his last illness, when nearly too ill to speak, he inquired anxiously for the welfare of a patient whom he had visited four days or so earlier. To a most unusual degree he retained the affection and confidence of his patients, and some of those whom he had visited in the early days of his practice remained on his "list" to the very end. In the closing months of his life it became more abundantly evident that his guiding principles were deep-seated and far-reaching. He was indeed a man who lived and died in the exercise of humble Christian faith.

My own debt of gratitude to him is very great, so great that I cannot attempt to describe it. Professionally he taught me much, and in very many other ways I owe him more than I can express.

JOHN RITCHIE, M.B.

Universities and Colleges.

UNIVERSITY OF LONDON.

AT a meeting of the Senate held on November 21st, Mr. W. Le Gros Clark, F.R.C.S., was appointed as from January 1st, 1924, to the newly instituted Readership in Anatomy at St. Bartholomew's Hospital Medical College. Mr. Le Gros Clark, who was a student at St. Thomas's Hospital, served with the R.A.M.C. during 1918-19, and during 1919-20 he was demonstrator in anatomy at St. Thomas's Hospital. Since 1920 he has been Principal Medical Officer at Sarawak, Borneo. He has published papers on ancient Eskimo skulls and on the Pacchionian bodies.

The D.Sc. degree in embryology was conferred on Miss Margaret Tribe, of University and King's Colleges, for a thesis entitled "The Development of the Hepatic Venous System and the Postcaval Vein in the Marsupialia."

It was resolved that the Physiological Laboratory Library should be kept together as part of the University Library and be developed in connexion therewith as a memorial to the late Professor A. D. Waller.

The following candidates have been approved at the examination for the Diploma in Psychological Medicine, with special knowledge of Psychiatry:

B. W. Brown, H. E. Brown, Isabel F. King, T. Lindsay, J. Wall.

NATIONAL UNIVERSITY OF IRELAND.

THE following candidates have been approved at the examination indicated:

M.B., B.Ch., B.A.O.—*J. J. O'Reilly, †G. F. Duggan, †T. Prendergast, †P. J. Kerley, †J. Faul, Annie G. Brereton, J. Callaghan, M. J. Canty, D. M. Clune, E. J. Collins, Jessie N. Cooke, W. J. Coyne, H. J. Croghan, P. G. Dooley, Honoria J. Doyle, A. R. J. Duncan, M. Farrell, E. S. Foley, Elizabeth M. Foley, B. Gallagher, T. Girvan, C. Godfrey, G. J. Hanly, J. F. Harrington, P. J. J. Hughes, G. J. Joyce, J. S. J. Joyce, P. E. Keogh, W. J. Kerrigan, T. J. Lynch, Kathleen G. McColgan, Mary J. McEvoy, Sarah A. McGee, F. McKernan, E. McManus, J. M. McNamara, T. W. Moran, Mary M. O'Flanagan, Cecilia Phillips, L. D'A. Quigley, Mary B. Quinn, Mary Ryan, Teresa M. Scott, T. Stokes, Anne Sullivan.

Exempt from further Examination in Part I (Medicine and Pathology).—Catherine M. Barry, W. Belton, J. G. Cooney, A. E. L. Kirby, Winifred M. O'Hanlon.

Exempt from further Examination in Part II (Surgery, Ophthalmology, Midwifery).—Margaret M. Armstrong, Marian Bergin, C. V. Connolly, T. J. Cronin, Teresa G. Cunningham, A. J. Cusack, M. F. Dodd, Mary K. Doherty, M. J. J. Doran, J. A. Flaherty, J. B. Hurley, Anne C. Kehoe, J. F. Kirwan, Annie Mulhern, J. O'Brien, Anne M. O'Dowd, Pauline K. O'Flanagan, P. J. O'Grady, T. E. Pierce, E. L. Sharpe, J. Travers, Nora Wallis.

D.P.H.—Mary J. Farrell, M. A. McInerney.

* First-class honours. † Second-class honours.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.
Annual Meeting of Fellows and Members.

WE have received the following further letter (see page 1009):

Sir,—As mover of the second resolution at the annual meeting of the Royal College of Surgeons of England on November 15th, I should like to be allowed to make a few remarks in connexion with the question of admitting Members to

...t on the Council. If the Council can be convinced that it ...s in the interests of the promotion of the art and science of ...urgery that Members be represented on the Council, the ...rgument would be a very strong one; the legal aspects of the ...atter or the democratic point of view does not interest them.

When it is remembered that a certain number of Members ...n the bigger centres do their own surgery, and that prac...ically all the provincial hospitals, except in university towns, ...re staffed by general practitioners, it will be realized that ...heir interest in the advancement of surgery is probably equal ...o that of the Council, added to whom we have the Members ...cattered all over the Empire, who mostly do their own sur...ical work. All these men have to do their work under more ...rduous and trying conditions than those on the staff of teach...ng hospitals, and they know the special difficulties that con...ront them as general practitioners.

The aim of the College is not only to turn out Fellows, but ...lso to make capable general practitioners—by far the larger ...umber, and equally important from a public point of view—...nd surely suggestions and recommendations from these men in ...eneral practice would be of help to the Council. The Council ...each in the medical schools and finally examine the students, ...ut they do not know the end-results of their work, and that ...an be remedied by giving Members some representation.—I ...am, etc.,

HOWARD M. STRATFORD,
London, W., Nov. 24th. F.R.C.S.Edin., M.R.C.S.Eng.

SIR,—In the account of the annual meeting of Fellows and Members of the Royal College of Surgeons in last week's issue, the President is reported as "saying" that "he had paid very careful attention to the answer he would give," whereas, what actually happened was that he merely read a previously prepared statement which had no reference whatever to what had transpired at the meeting itself. The President's reply was merely a repetition of the contentions put forward at last year's meeting by the then president, and made no reply to the complete refutations made both by Dr. Nash and Dr. Roche. Your readers should also know that the President's reply was received with chilling silence!

It is truly amazing that the Council of the Royal College of Surgeons cannot even now seen that a co-operation of Members and Fellows in the government of the College would be to the benefit of all concerned.—I am, etc.,

London, W., Nov. 27th. C. E. WALLIS.

The Services.

ROYAL ARMY MEDICAL CORPS.

Examination for Commissions.

AN examination for not fewer than forty commissions in the Royal Army Medical Corps will be held on January 30th next. Applications should be made to the Secretary of the War Office not later than January 20th, and the presence of candidates will be required in London from January 28th. Meanwhile those intending to compete can obtain a full statement of the duties and emoluments of the service on making written application to the Secretary, War Office, Whitehall, London, S.W.1.

Medical News.

A BRONZE tablet in memory of the late Mr. Charles Wray has been erected at the Croydon General Hospital. The tablet, with medallion portrait, is the work of Mr. H. J. Youngman, and bears the following inscription: "To honour the memory of Charles Wray, F.R.C.S.Eng., who for thirty-five years was ophthalmic surgeon to this Hospital. This monument is set up by his patients as a token of love and gratitude."

THE French Minister of Public Instruction has introduced a bill for the purpose of awarding to Madame Curie a pension of Fr. 40,000 per annum, in recognition of her scientific work. It is proposed that the pension shall be conferred on December 28th—the twenty-fifth anniversary of the announcement of the discovery of radium by Madame Curie and her late husband.

A COURSE of five lectures on "The influence of environment on the life of bacteria" will be given by Mr. F. W. Twort, M.R.C.S., L.R.C.P. (Superintendent of the Brown Institution), in the theatre of the Royal College of Surgeons of England, W.C., on December 11th, 13th, 17th, 18th, and 20th, at 4 p.m. Admission is free without ticket.

DR. R. C. FIELD of Roos, near Hull, has been presented by his friends and patients with a mahogany grandfather clock, an album containing the names of the subscribers, and a cheque for the balance of money collected, as a mark of their regard on the occasion of his retirement from practice in Roos and district.

A MEETING of the Metropolitan and Home Counties Maternity and Child Welfare Sub-Group of the Society of Medical Officers of Health will be held at 1, Upper Montague Street, Russell Square, W.C.1, on Friday, December 7th, at 5.30 p.m., when Dr. J. W. Carr will read a paper on signs and symptoms of tuberculosis of the respiratory system in children under five. The meeting is open to all members of the medical profession.

THE Harben Lectures at the Royal Institute of Public Health will be given on December 11th, 12th, and 13th by Professor D. Levaditi, M.D., of the Institut Pasteur, Paris. The first lecture will deal with neurotropic virus (encephalitis herpes), the second with neuro-vaccine, and the third with new discoveries in the treatment and prophylaxis of syphilis. All interested are invited to attend these lectures, which will be given at 37, Russell Square, London, W.C.1, at 5 p.m. each day.

A FESTIVAL dinner in aid of the Royal Northern Group of Hospitals was held at the Mansion House, London, on November 21st, under the chairmanship of Admiral of the Fleet Earl Beatty. In proposing the toast of "Success to the Hospital" Lord Beatty mentioned the progress made since its humble origin sixty-seven years ago. The group of hospitals into which it had grown—the Royal Northern Hospital in Holloway, the Royal Chest Hospital in City Road, the Hospital of Recovery at Southgate, and the Reckitt Convalescent Home at Clacton-on-Sea—served a population of more than a million in an area of seventy square miles. Of the 375 beds possessed by the group, 70 had had to be closed owing to a debt of £50,000. The chairman's appeal for generous support for the associated institutions was supported in an eloquent speech by Miss L. M. Faithfull, late Principal of Cheltenham Ladies' College. The Marquess of Northampton (chairman of the hospital), in responding to the toast, expressed thanks to the Lord Mayor for granting the use of the Mansion House, and referred to the forthcoming opening of the new casualty department by the Prince of Wales, president of the group. The health of the Lord Mayor and Corporation was proposed by Sir Philip Sassoon, seconded by the Rev. Basil Bourchier, and acknowledged by the Lord Mayor. The Secretary, Mr. Gilbert G. Panter, then announced that the donations in response to the present appeal amounted to £11,643. A successful evening closed with the health of the Chairman, proposed by Lord Riddell and supported by Mr. G. B. Mower White, emeritus surgeon to the Royal Northern Hospital.

A FESTIVAL dinner in aid of the appeal for funds by the London Jewish Hospital, Stepney, was held at the Connaught Rooms on November 26th under the chairmanship of Sir Humphry Rolleston, K.C.B., President of the Royal College of Physicians of London. About seven hundred were present. After the Royal toasts had been duly honoured and letters of regret read from those who had been prevented from attending, the chairman proposed the toast of the "London Jewish Hospital." He said that the old familiar saying that it was more blessed to give than to receive was very appropriate on the present occasion, for in the past the Jewish Hospital, like any other hospital in London, had given far more medical help and surgical skill than it had received financial consideration. The institution was founded in 1907, and though still in its teens was full of promise and was doing good work. The crowded East End of London was poor in hospital beds; the number of patients seeking admission to the 50 beds was at the rate of 880 per annum, which indicated that the number of beds ought at least to be doubled. A proof that the hospital was unsectarian was afforded by the fact that of the 52,000 out-patient attendances in 1922 no less than 40 per cent. were other than those of the Jewish faith. There were Italian, French, and German hospitals in London, and he saw no reason why there should not be a Jewish hospital. Sir Humphry Rolleston added that he could most emphatically bear testimony to the excellence of the medical, surgical, and nursing staffs, and he hoped that the appeal for funds would meet with generous support. The Very Rev. Dr. M. Gaster, in responding to the toast, said that the doors of the hospital were always open to the sick and suffering without any questions being asked as to their creed. Mr. I. Berliner, who also responded, gave statistics showing the growth of attendances of patients since the opening. The toast of "The Guests" was proposed by the Chief Rabbi, the Very Rev. Dr. J. H. Hertz, and that of the "Medical Profession" by Mr. H. H. Haldin, K.C., the latter being acknowledged by Sir John Bland-Sutton, President of the Royal College of Surgeons of England, and Dr. J. Burnford, senior physician to the hospital. It was announced that the donations received and promised had reached the sum of £3,000.

DR. G. B. GRIFFITHS, Medical Inspector of H.M. Prisons, has been appointed one of the Commissioners under the Prison Act, 1877.

THE annual dinner of the Old Epsomian Club will be held on Thursday evening, December 13th, at 7.30 p.m. The chair will be taken by Mr. W. Æ. Mackay. Further particulars can be obtained from Mr. S. Maynard Smith, F.R.C.S., 49, Wimpole Street, W.1.

A DISCUSSION on the introduction of breeding heifers from Canada if certified free from tuberculosis will take place at a conference of veterinary officials to be held at the Royal Sanitary Institute (90, Buckingham Palace Road, S.W.) at 3 p.m. on Friday, December 14th. It will be opened by Alderman W. Phene Neal, late chairman of the Cattle Markets Committee for the City of London.

AN institute for the study and treatment of cancer has been founded in Madrid by the Spanish Committee for the Study of Cancer under the direction of Dr. Goyanés.

PROFESSOR RECASENS, dean of the Madrid Faculty of Medicine, has been created a Commander of the Legion of Honour.

DR. JULIUS HIRSCHBERG, the well known ophthalmologist and editor of the *Zeitschrift für praktische Augenheilkunde*, celebrated his 80th birthday on September 18th.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London*; telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Medisecra Westrand, London;* telephone, 2630, Gerrard.

The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh*; telephone, 4361, Central).

QUERIES AND ANSWERS.

PHYSIOLOGICAL ALBUMINURIA.

"R. B." asks where a good account of so-called physiological albuminuria can be found.

*** Hilton Fagge (*Principles and Practice of Medicine*, edited by Pye-Smith, 1886, vol. ii, pp. 436-438) gives the history of the recognition of physiological albuminuria from 1878. Pavy (*Lancet*, 1886, i, 437, March 6th) described cyclical albuminuria; hence it has been called Pavy's "disease." Dr. W. Collier (BRITISH MEDICAL JOURNAL, 1907, i, January 5th) gave an interesting account of "Functional albuminuria in athletes," based on much experience among rowing men at Oxford. Dr. Parkes Weber (BRITISH MEDICAL JOURNAL, 1921, i, 79, January 15th) has recently given an instructive account of orthostatic and postural albuminuria. Samuel West, in the course of his Lettsomian lectures at the Medical Society of London, 1899, devoted much attention to albuminuria in apparently healthy persons (*Trans. Medical Society of London*, 1899, xxii, pp. 136-152) with much statistical matter. These lectures were also published in book form, *On Granular Kidney and Physiological Albuminuria* (1900. London: Henry J. Glaister).

PREMATURE BALDNESS.

"M." asks for information as to the modern treatment of alopecia simplex (premature baldness) with special reference to electric or light treatment. Is pilocarpine (he asks) any good, and in what doses?

*** It is not easy to answer this question since the subject is large and has many aspects. Briefly, however, avoiding the larger issues, the present position may be summed up in the following way. The term "premature baldness"—which has not precisely the same meaning as alopecia simplex—includes three states: seborrhoeic, pityriasic, and true premature baldness. In the first two a definite abnormal condition of the scalp can be observed apart from the fall of hair—either an inflammatory seborrhoea, or the condition named pityriasis or dandruff. Where these conditions are found hope may be entertained of improvement by the use of local applications such as resorcin lotions, tar pomades, and by washing at regular intervals with, for example, Hebra's spirit soap. In true premature baldness, on the other hand, it is often the case that no abnormal condition of the scalp can be detected; the tendency is often familial, and where this hereditary disposition to loss of hair exists apart from local disease of the scalp the prognosis is very bad. There is a progressive fall of hair usually resulting in the characteristic baldness over the vertex and forehead. Even in this condition it is worth while attempting to retard the loss of hair by treatment. The methods employed have as a common basis the production of an increased vascularity to the scalp, such as by stimulating applications (ammonia, cantharides, and the like), by high frequency, or by direct massage. These remedies, especially cantharides, are not without harmful effects if used incautiously, and cantharidin has even been accused of causing nephritis. Pilocarpine is of dubious value. It is not perhaps outside the scope of the present inquiry to include within the group the forms of alopecia following general diseases such as acute infections, syphilis, and cancer, leukaemia, tuberculosis, etc. Their treatment resolves itself into treatment of the causal disorder, but even in such circumstances local applications are not without benefit in accelerating the regrowth of hair.

SPIRIT IN HAIR WASHES.

"I. B. M.," noting that prescriptions for hair washes given in books on dermatology contain a large proportion of rectified spirit, asks whether there is any suitable cheaper substitute, and whether methylated spirit would be safe. He also asks whether the purplish tint now given to methylated spirit would stain the scalp or affect the colour of the hair.

*** The Board of Customs and Excise does not permit the use of methylated spirit in the preparation of prescriptions. The point as to staining, therefore, does not arise. The position is explained in Martindale's *Extra Pharmacopoeia*, seventeenth edition, vol. ii (p. 121). A possible substitute for rectified spirit is propyl alcohol; its bactericidal action is about equal to that of ethyl alcohol, but normal propyl alcohol is considerably more toxic and is unsuitable for the preparation of tinctures and the like. There is a note upon the subject in the *Pharmaceutical Journal* of February 3rd, 1923 (p. 87). There are two isomeric propyl alcohols: normal propyl alcohol is one of the constituents of fusel oil, from which it is prepared by fractional distillation; isopropyl alcohol, or dimethylcarbinol, differs slightly in physical characters. As imported from America, where it is a by-product in the petroleum and natural gas industry, it contains 91 to 92 per cent. alcohol, and is a colourless liquid. Its odour differs from that of rectified spirit, but is not unpleasant, as is that of normal propyl alcohol. Isopropyl alcohol may be used externally for hand disinfection, either alone or containing green soap in solution. A lotion containing 30 to 50 per cent. in water has been used for the treatment of acne or seborrhoea.

LETTERS, NOTES, ETC.

THE TREATMENT OF HAEMORRHOIDS BY INTERSTITIAL INJECTIONS.

DR. T. M. KENDALL (Newport, Isle of Wight) writes: I have been interested in the communications of Dr. Dunbar (November 3rd, p. 808) and Mr. Morley (November 10th, p. 901), as I have used the same treatment as Dr. Dunbar with great success for some years. I, however, employ a stronger solution (15 per cent. carbolic acid in liquor hamamelidis); I have also used glycerin along with carbolic acid and witch-hazel, but I much prefer to leave it out. Recently I have been using high frequency currents with success and great freedom from pain. I still use the injection in most cases and have never had a failure. I agree with Mr. Morley that it is not through causing thrombosis we have success.

HISTORY OF ST. GEORGE'S HOSPITAL.

MR. J. M. CHURCHFIELD, Secretary-Superintendent of St. George's Hospital, writes: With reference to the article on the history of this hospital, printed in the BRITISH MEDICAL JOURNAL of November 24th (p. 991), the remark is made that the document referred to appears to have been hitherto unknown to the present authorities of St. George's. I am desired to inform you, however, that a copy of this document will be found in the *History of St. George's Hospital*, Part I, written and published in 1910 by Dr. G. C. Peachey.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals will be found at pages 36, 37, 40, 41, and 42 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 38 and 39.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 259.